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ABSTRACT

The conference brought together 45 persons who have had extensive experience in nurse staffing research. After the leadoff paper by Myrtle K. Aydelotte, which presented an overview of nurse staffing research, 10 papers were presented on variables considered to be significant in influencing the quantitative and qualitative demand for nurse staffing. These included patients' requirements for nursing services, architectural design of the hospital, administrative and cost factors, and social-psychological factors. In addition, papers were presented on the evaluation of quality of nursing care and the impact of computerized information systems on staffing. The papers were followed by presentations by discussion leaders who addressed themselves to points raised in the papers. These presentaions, the opening remarks of Jessie M. Scott, and a summary and synthesis of the entire conference are also included in the publication. Appended are four task force reports offering recommendations on future directions for research. (Author/MW)

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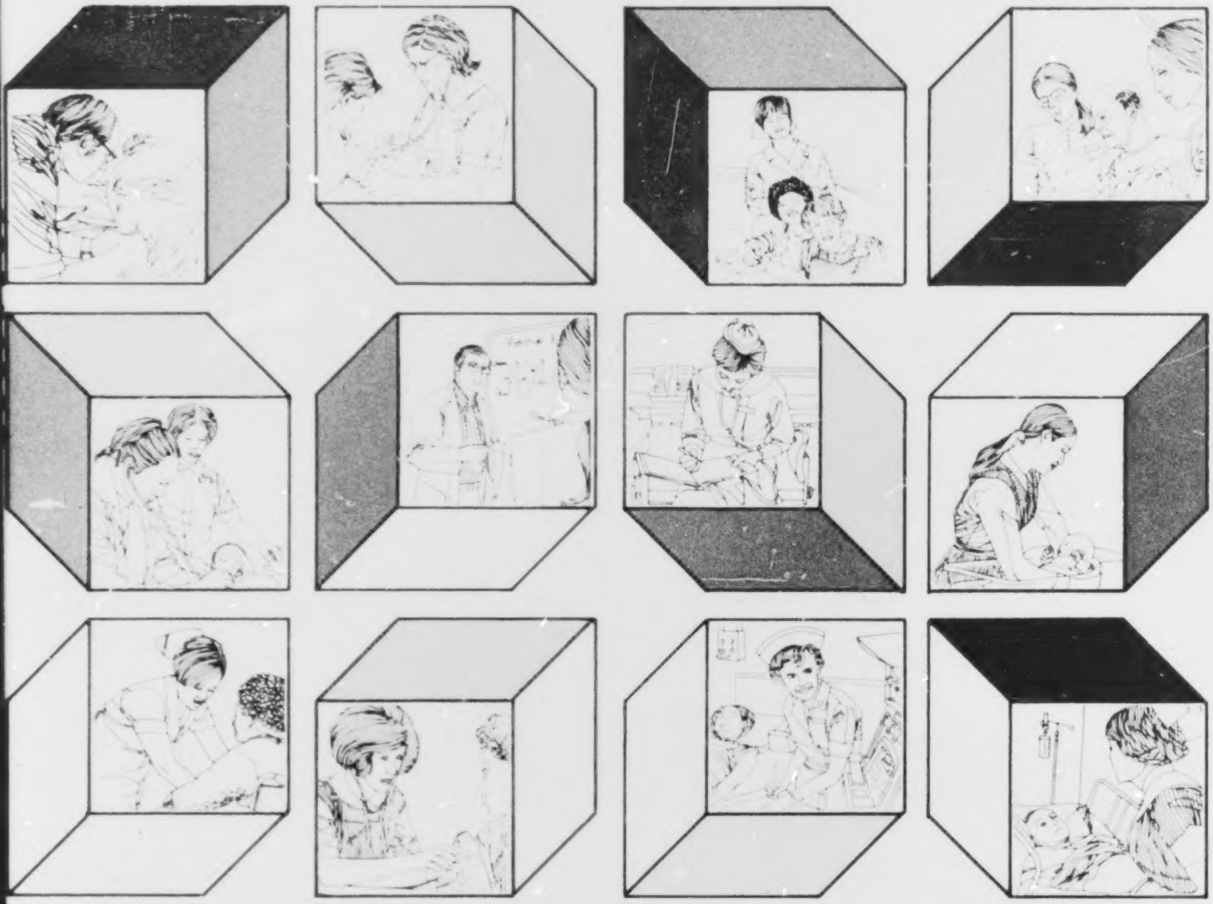

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Research on Nurse Staffing in Hospitals

Report of the Conference

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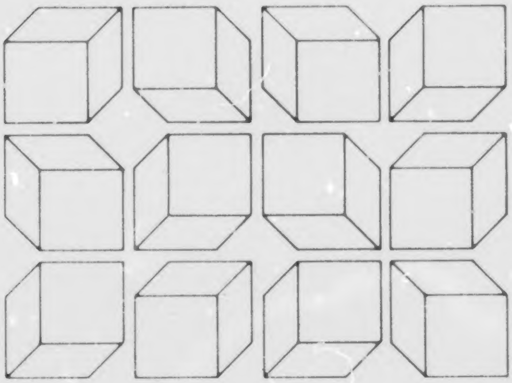

Research on Nurse Staffing in Hospitals

Report of the Conference

MAY 1972

Conducted by
DIVISION OF NURSING

Eugene Levine, Ph.D.
Scientific Editor

DHEW Publication No. (NIH) 73-434

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE NATIONAL INSTITUTES OF HEALTH
Bureau of Health Manpower Education Division of Nursing

Foreword

This publication contains a report on the Conference on Research on Nurse Staffing in Hospitals, sponsored by the Division of Nursing and held in Fredericksburg, Virginia, May 23 through 25, 1972.

I am hopeful that it will prove to be a valuable addition to the literature on nurse staffing. As the opening paper by Dr. Myrtle K. Aydelotte makes clear, the existing literature has many deficiencies, not the least of which are the many gaps in knowledge. The papers presented at the conference contain the latest findings on many important areas of nurse staffing research and will help to close these gaps.

The Division of Nursing's concern with the problems of nurse staffing goes back many years as we have attempted to improve the quality and quantity of nursing care in the Nation. We have supported considerable research in this area, both by our own staff and through grants and contracts to researchers in universities and professional organizations and in hospitals and other health care settings. The many publications issued by the Division in addition to study findings include descriptions of methodology for studying the use of nursing skills, assessing the quality of nursing care, and planning for better matching of nursing resources and needs. The conference and this resulting publication are natural extensions of our efforts to improve nurse staffing.

This publication is a companion volume to Dr. Aydelotte's comprehensive critique of nurse staffing methodology. These two publications should be useful to researchers, educators, administrators, practitioners, and all who are concerned with the improvement of nursing staffing in hospitals.

Jessie M. Scott

JESSIE M. SCOTT
Assistant Surgeon General
Director
Division of Nursing

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Introduction

The Conference on Research on Nurse Staffing in Hospitals brought together 45 persons from a variety of disciplines who have had extensive experience in nurse staffing research. The conference was held in Fredericksburg, Virginia, May 22 through May 25, 1972.

After the leadoff paper by Dr. Myrtle K. Aydelotte, which presented an overview of nurse staffing research, 10 papers were presented on variables considered to be significant in influencing the quantitative and qualitative demand for nurse staffing. These included patients' requirements for nursing services, architectural design of the hospital, administrative and cost factors, and social psychological factors. In addition, papers were presented on the evaluation of quality of nursing care and the impact of computerized information systems on staffing.

The papers were followed by presentations by discussion leaders who addressed themselves to points raised in the papers. These presentations, which were planned to stimulate the discussion during the period that followed each paper, are also contained in this publication.

Also included are the opening remarks of Miss Jessie M. Scott, Director of the Division of Nursing, and a summary and synthesis of the entire conference by Dr. Mary K. Mullane.

In addition to participating in the general discussion, each person attending the conference was assigned to a task force. The purposes of the task forces were to delineate areas of needed research in nurse staffing in hospitals, determine research priorities, and explore means of coordinating the work of researchers in this field. Reports of the four task forces are contained in the appendix.

Taken as a whole, the material presented in this publication serves several purposes. First, it brings together the latest findings on important areas of research into factors related to nurse staffing in hospitals. Second, it points up some of the gaps in existing knowledge and suggests how these may be closed. Finally, it constitutes an important step forward in correcting the meager, diffuse condition of the existing research in hospitals.

Eugene Levine, Ph.D.
Chairman, Planning Committee
Conference on Research on Nurse
Staffing in Hospitals

Opening Remarks

Miss Jessie M. Scott

Assistant Surgeon General
Director, Division of Nursing
Bureau of Health Manpower Education
National Institutes of Health

Greetings and Welcome

I am very pleased to welcome all of you to the Division of Nursing Conference on Research on Nurse Staffing in Hospitals. This conference is the culmination of 6 months of planning by a committee made up of our Division staff, whose names are listed in your programs: Dr. Bernard. Ferber; Dr. Myrtle Aydelotte, who will serve as conference chairman; and Dr. Mary Kelly Mullane, who will be summarizer. The committee tells me their work was made much easier by the excellent cooperation they received from each of you in accepting assignments to prepare papers or to serve as discussion leaders and in making your travel arrangements to the conference center.

Each of you was selected as a participant in the conference because of the research you have done in the field of nurse staffing or because of other activities that have advanced the knowledge or understanding of the field. We indeed feel we have a truly distinguished group of participants. You represent different professional backgrounds and different geographic settings.

We are pleased to note the presence of participants from England and Canada. Among you are nurse administrators, nurse educators, and nurse researchers, economists, industrial engineers, systems analysts, statisticians, psychologists, sociologists, computer scientists, and hospital administrators. You have written about and have studied the problems of nurse staffing deeply and extensively. We hope you will share with us during the course of the conference your activities and ideas.

Background of the Conference

The Division of Nursing, which is part of the Bureau of Health Manpower Education in the National Institutes of Health has as its primary mission the improvement of the quantity and quality of nursing manpower. Although the major thrust of our activities is in the area of nursing education, we have been concerned over the many years with the improvement of nursing services. To catalog the many activities that the Division has been engaged in over the past 20 years in the area of nurse staffing, both intramurally and extramurally, would require much more time than I have allotted, but let me cite a few examples.

In the early 1950's, concerned with the severe shortage of nursing personnel in hospitals and the widespread desire of hospitals and nursing administrators to have numerical guidelines for staffing, our Division initiated a study that became known as "the green book." This was a design to test the relationship between nursing care and patient welfare. The central hypothesis of this design was that if nursing care were varied quantitatively and qualitatively the effects of these changes could be measured.

This design became the basis for several major studies. One was directed by our chairman, Dr. Aydelotte. Another was conducted in Kansas City by the Community Studies Organization. A third was conducted by members of our own Division, which attempted to establish a relationship between nursing hours available to patients, and patient and personnel satisfaction with care.

In the area of industrial engineering applications to nurse staffing, the Division of Nursing has supported several important projects that have been carried out extramurally. One of these, conducted at Johns Hopkins Hospital under the direction of Dr. Charles Flagle, has inspired considerable application of industrial engineering methods to the problems of nurse staffing. These methods include workload measurement, work simplification, task analysis, mathematical modeling, and quality control.

In recent years the attention of our Division staff has turned toward a broadened look at the nurse staffing problem in hospitals. Our statistical studies have shown that quantitative levels of nurse staffing in hospitals are influenced by a great variety of factors, including the needs of the patients, the administrative organization and administrative style, the characteristics of the nursing staff, the physical plant, the economic structure within and outside the hospital, and a host of psychological and sociological factors. A recent study we supported, known as *The Illinois Nurse Utilization Study*, attempted to measure the effects of many of these factors on nurse staffing in a sample of 31 hospitals. The project director, Mrs. Margaret Ellsworth, is here with us and I am sure you will be hearing about the methodology and results of this study in the course of the conference.

Also among our current concerns and activities is the matter of the expanded role of the nurse. With the health system undergoing rapid changes and the role of the nurse in this system widening, it is important for us to anticipate these changes and to be prepared to provide the educational base necessary for such an expanded role.

Objectives of the Conference

We could say the main theme of this conference is an examination of the important factors that affect nurse staffing. We are going to hear about some of the methodology for measuring the impact of these factors and we shall examine the findings of studies directed toward specific factors such as patient requirements for nursing services, architectural design, economic costs, administrative techniques, and psychological and sociological factors. We shall hear about the problems of measurement in nurse staffing research, including measurement of the quality of nursing care. Finally, we shall hear about the work being done in applying computerization to nurse staffing and the impact this could have on the quantity and quality of staffing.

We are limiting ourselves to nurse staffing in hospitals with the full realization that out-of-hospital health care settings are becoming increasingly important in the delivery of health services. We are focusing on hospitals because, frankly, most of the research has been done there. This is so because hospitals are the largest employers of nursing personnel, employing over 60 percent of the 748,000 registered nurses actively employed in nursing and over 90 percent of the more than one million licensed practical nurses and nursing aides, orderlies and attendants.

I feel that much of the research in hospital nurse staffing can have useful application in other health care settings. Specifically, I see four immediate and long range objectives of our conference. First, I see this conference as a supplement to Dr. Aydelotte's study entitled *Nurse Staffing Methodology: A Review And Critique of Selected Literature*.[1] In this study, done under contract with our Division, Dr. Aydelotte has identified a number of important areas of research on the factors we have cited as related to nurse staffing. Her study has identified the researchers in these areas, and it was on the basis of her report that we were able to identify participants for this conference and to get a perspective on the work they have been doing. In fact, the research of many of those present here today is discussed in Dr. Aydelotte's report. So, in a sense this conference brings her report to life. The proceedings of this conference is a companion volume to Dr. Aydelotte's study.

A second objective is to bring together a group of knowledgeable researchers, management engineers, administrators, consultants, and educators to exchange information and ideas about the problems of nurse staffing. We shall be particularly concerned with the factors that influence nurse staffing, either positively or negatively, as well as quantitatively or qualitatively. It is my feeling that a great deal of research and methodological development are going on in various places but that there is not enough communication among the different persons engaged in these activities.

One of Dr. Aydelotte's conclusions is that researchers, in writing up their work, only infrequently cite previous work. To me this indicates a lack of information exchange among those working in the field. Hopefully, this conference will be the starting point for opening up channels of communication that will continue beyond the conference.

A third and most important purpose of the conference is to set forth a program of research on nurse staffing for the future. We shall learn from our presentations and discussions that some significant research has been conducted. We shall hear about the methodologies and the findings of these projects and from this should be able to identify the important gaps in knowledge and methodology. From our deliberations we can then chart a plan for the future for the kinds of studies that should be undertaken, including suggestions as to how they might be initiated and with what kinds of support.

This support does not necessarily have to come only from the Federal Government. I am often pleasantly surprised by how much useful research has been accomplished on limited resources. Although the problems of nurse staffing are large, useful solutions can sometimes be found through small, modest investigations, including doctoral dissertations and even master's theses. Let us then keep in mind as the conference proceeds that we would like to delineate areas for further research, and we invite suggestions about the most practical, feasible, and productive ways of pursuing this needed research. Our small group sessions on Wednesday afternoon will be specifically directed toward this subject and will provide for each of you an opportunity to share your ideas.

Finally, I would hope that the proceedings of this conference could provide educational materials for nursing service administrators and other practitioners as they face their day-to-day problems of running their health care institutions. A great deal has been written about research on nurse staffing in hospitals, but much of it is of a technical and somewhat specialized nature. As I said earlier, a major mission of our Division is to help advance the education of nursing personnel, and I hope the proceedings of this conference will give administrators some assistance in managing their institutions.

I hope you will be motivated to participate in the discussions as much as possible. Each presentation will be followed by a 45-minute discussion period. I cannot urge you too strongly to participate to the fullest extent possible during these discussion periods. Each of you has been selected because of your extensive background and interest in this field, and I am sure you have many worthwhile ideas and much information to share with us.

In conclusion, let me say that I anticipate this conference will be a rewarding and fruitful experience for all of us and that it will provide guidelines for future conferences of this kind and lay the groundwork for continuing dialogue. Now I would like to introduce your conference chairman, Dr. Myrtle Aydelotte. Dr. Aydelotte is Director of Nursing, University Hospitals and Clinics, and a professor at the College of Nursing, University of Iowa in Iowa City. As I have already mentioned, she was the project director of a very important study of the relationship between nurse staffing and patient welfare conducted during the late 1950's and recently has completed a comprehensive critique of nurse staffing methodology. I place this conference under her most capable direction.

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[1] U.S. Department of Health, Education, and Welfare, Public Health Service, National Institutes of Health. DHEW Publication No. (NIH) 73-433. Washington, D.C.: U.S. Government Printing Office, January 1973.

State of Knowledge: Nurse Staffing Methodology

Myrtle K. Aydelotte, Ph.D
Director of Nursing, University Hospitals and Clinics
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Introduction

Many individuals working within the delivery and education systems of the health field recognize the need for a well defined body of knowledge that can serve as a basis for nurse staffing methodologies. Researchers from several disciplines have attempted to study the effect of one or more variables upon staffing, and methodologists have tried to develop specific approaches for determining nurse staffing needs. Often, however, these efforts have been carried out in isolation and have been inadequately reported to the profession. Many have also been fragmented in approach and have not dealt with all the relevant problems. Frequently, such studies have been prompted by the need for the economic use of personnel and have ignored variables other than cost. Unfortunately, no person or group has assembled and assessed the literature on the subject of staffing.

In May of 1970, I was approached by the Division of Nursing with the request that I undertake this task. Work on the project[1] began late in June 1970 and was completed in December 1971. The lengthy, frustrating search of the literature resulted in the identification of over a thousand pieces related to the subject. After screening, 182 of those that seemed most important and representative were selected, reviewed, and critiqued.

The primary aim was to "screen, review, and critique relevant research, studies, and approaches focused on measuring nursing care needs in the hospitals." Development of the research protocol involved preparing statements of objectives, specifying criteria for the estimation of relevance and value, formulating definitions of terms for research and classification and constructing a glossary of terminology. Procedures for review and critique were outlined and followed.

Each research paper was examined to determine its value as a research study with regard to the following:

- the significance of the problem to the field of nursing, to nurse staffing methodology,
- the theoretical framework for investigation,

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[1] Contract Number NIH-70-4193.

- the aspects pertinent to the measurement of nursing care requirements and prediction of nurse staffing needs,
- the relevance of the research design to general problems of nurse staffing,
- the use of specific innovations, including adaptations of other approaches,
- the variables treated in the study that were significant for the methodology of staffing,
- the tools and instruments most easily translated into present day use,
- the feasibility of applying any portion of the research to staffing methodology.

This review dealt primarily with books, including monographs, research reports, and theses. Of literature in this classification, 77 pieces were major research reports. Certain other materials, which did not come under any of these headings, were also examined. Unfortunately, most of these did not provide enough detail to make possible the application of the criteria developed for the above points. Many of them did not, in any case, purport to be scholarly undertakings. These items were read for whatever assistance they could provide in clarifying and identifying ideas that might be used in approaches to the question of nurse staffing.

The variation in types of literature reviewed makes a general summation of the analysis difficult. The materials were diverse in many respects. They varied in the purposes for which they were written; in publication outlet; in the detail of documentation of content; and above all, in scholarly skill as measured by organization of content, quality of source materials, logical rigor, style of writing, and presentation of new knowledge.

There is no dearth of literature on the general subject of nurse staffing, but the number of tightly conceived, well structured explorations of the central issues is sadly limited. There are only a few comprehensive, well designed research studies directed toward examining a specific staffing model and its impact on patient care and cost.

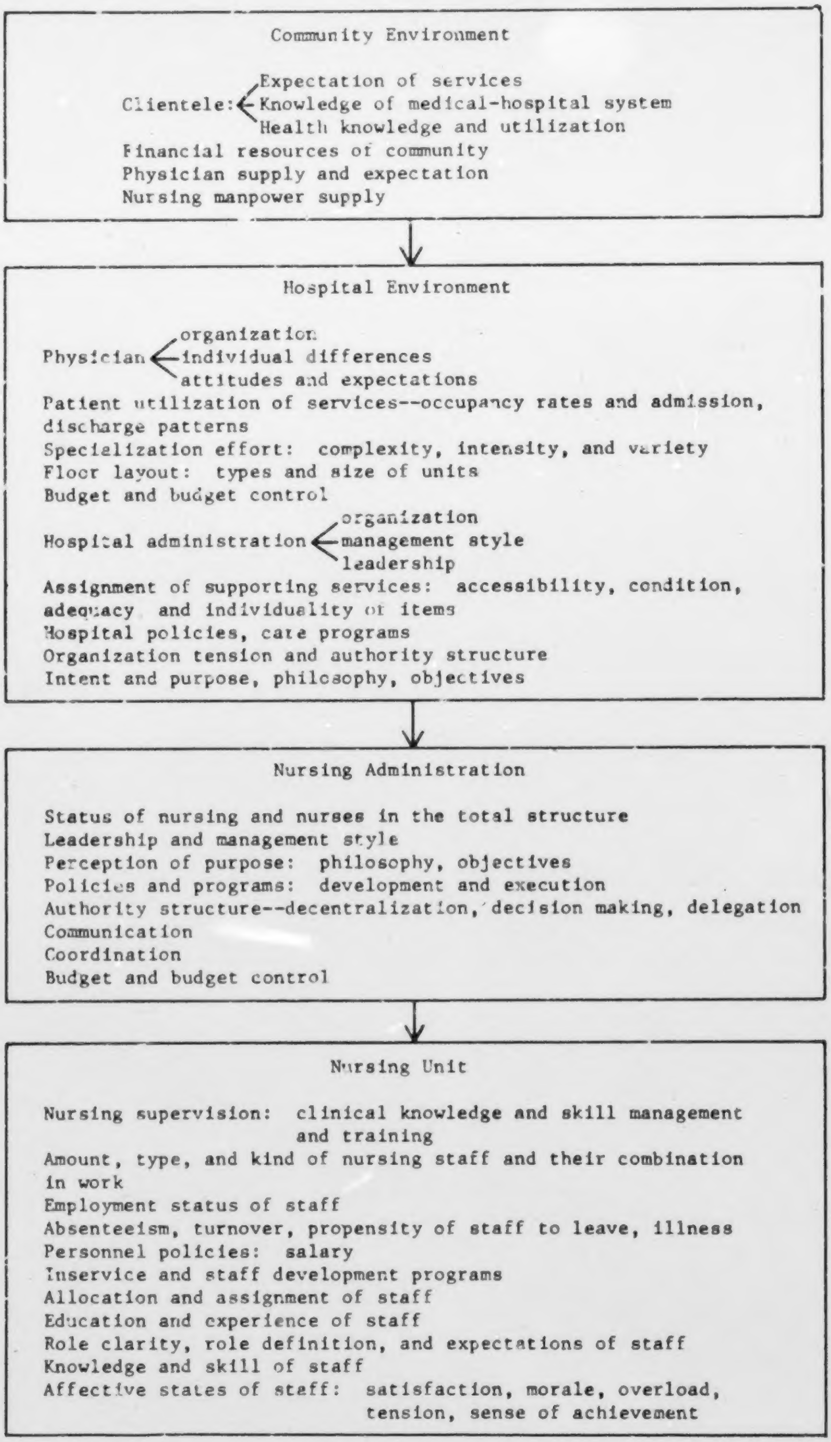
General Characteristics of the Literature

Most of the literature reviewed was poor in quality. Though this judgment is of necessity purely subjective, it is at least based on an appraisal of each study with respect to the eight points mentioned at the outset. Many authors fail to give a thoughtful, carefully stated description of a problem and its analysis. For the most part they do not provide reviews of the literature or references to related research studies, even when these are needed to support the presentation. Theoretical framework, or at least some embryonic structure for a rationale, is absent in many studies and reports. The lack of acknowledgments, even when similar points are made, suggests that some topics were explored concurrently by writers working independently. It is difficult to determine the impact of specific works or the links between individual efforts.

The number of variables treated in different studies ranges from a few to hundreds. The service offered in a nursing unit depends upon many factors other than the requirements of the patients. It depends upon the purpose of the unit, medical and nursing programs of care, supporting services made available to the nursing unit, physical layout of the unit, and competency of the nursing staff. The scheme of total nursing care delivery also includes forces affecting nursing unit production from the environments external and internal to the hospital including the many systems other than nursing (see figure 1).

The authors of the various pieces of literature vary in their style of writing and quality of reporting. The sophistication of analysis in different studies appears to be related to the background of the author, the purpose of the writing, and the nature of the problem. In the research reports, only a few writers state the assumptions underlying the selection of the statistics used in the analysis and present evidence that these assumptions are met. In a few studies, however, that could serve as models, the writing is clear, well edited, and logically organized. The use of language seems to reflect the author's understanding of the audience to which he is directing his ideas and, in some cases, his understanding of the editorial policy of the journal in which the article appears. What is disappointing in much of the literature is the

Figure 1. Scheme of nursing care delivery system.



Community Environment

Clientele:
  - Expectation of services
  - Knowledge of medical-hospital system
  - Health knowledge and utilization

Financial resources of community
Physician supply and expectation
Nursing manpower supply

Hospital Environment

Physician
  - organization
  - individual differences
  - attitudes and expectations

Patient utilization of services--occupancy rates and admission, discharge patterns
Specialization effort: complexity, intensity, and variety
Floor layout: types and size of units
Budget and budget control

Hospital administration
  - organization
  - management style
  - leadership

Assignment of supporting services: accessibility, condition, adequacy and individuality of items
Hospital policies, care programs
Organization tension and authority structure
Intent and purpose, philosophy, objectives

Nursing Administration

Status of nursing and nurses in the total structure
Leadership and management style
Perception of purpose: philosophy, objectives
Policies and programs: development and execution
Authority structure--decentralization, decision making, delegation
Communication
Coordination
Budget and budget control

Nursing Unit

Nursing supervision: clinical knowledge and skill management and training
Amount, type, and kind of nursing staff and their combination in work
Employment status of staff
Absenteeism, turnover, propensity of staff to leave, illness
Personnel policies: salary
Inservice and staff development programs
Allocation and assignment of staff
Education and experience of staff
Role clarity, role definition, and expectations of staff
Knowledge and skill of staff
Affective states of staff: satisfaction, morale, overload, tension, sense of achievement

lack of precise wording, the ambiguity of the statements, and the absence of a logical development of ideas. This criticism, however, should be somewhat softened in view of the fact that some of the literature was not written for publication. A number of pieces were clearly designed merely as exhibits to be used in an oral presentation.

Study of the literature leaves the reader with the impression that the amount written on the subject is vast, highly uneven in quality, and available through many outlets. The quality of the reporting itself often gives grounds for concern. The value of what is written is often questionable, since the writing lacks sufficient detail to provide effective support for the argument.

This literature review makes possible several statements about what we do and do not know about nurse staffing. It points up the gaps in our knowledge about many variables generally regarded as related to staffing. It also indicates that we must urgently proceed with studies of this important subject. It is also highly desirable that the research results be cumulative. To help toward this goal, individuals studying staffing should attack similar problems, ask similar questions, and keep in touch with one another. It is imperative that the investigations be based upon carefully designed theoretical structures.

The generalizations I am going to make are organized around the elements of a staffing program: measurement of what nurses do and what patients require; measurement of quality of product produced; factors which influence the work of nurses and, consequently, numbers and kind of staff that must be predicted; and methodologies currently used in hospitals to determine staffing needs.

Measurement of Nursing Activity

In much of the literature reviewed, nursing work basic to staffing predictions was measured by the application of four standard techniques of work measurement developed by the engineering profession:

- time study and task frequency count,
- work sampling of nurse activity,
- continuous observation of nurse performing activities,
- self-report of nurse activity.

All four techniques involve the estimate of time required for performance. Differences in techniques reside in the methods by which data are collected, how the data are categorized, how amounts of time are estimated, and how minutely nursing work is described.

There is no question about the feasibility of these techniques. Furthermore, they are sound and well tested and can produce reliable data if properly applied. Nevertheless, there are two major objections to the use of these techniques in the measurement of nursing. The first relates to the logic underlying their use in the study of nursing practice. The second is the degree of precision with which the needed data can be or have been collected.

First, the conceptualization of nursing practice derived from these work measurement techniques is limited both in scope and character. Their use implies that nursing work is distinctly procedural in character: task oriented with specific beginnings and endings. Such a measurement does not reflect the sweep of the effort. Nor does it properly convey a sense of the great complexity of knowledge and skill necessary in nursing practice. The application of these techniques assumes as an optimal goal the type of nursing that even through ordinary practices may involve considerable interruption and discontinuity.

Although the nursing units selected by the investigator may be those whose staffs are regarded as providing the best present nursing care in a hospital, one can raise questions as to whether the nursing practice observed is the most effective that *can* be provided. In none of the literature reviewed were there models of the optimum nursing practice that could be achieved under the constraints of the situation. Descriptions of nursing activities obtained by these techniques tend to reflect mainly the *status quo* of nursing practice, including the ritualistic and unnecessary, ineffective acts. Omissions of care are not identified.

To design a model of nursing meeting desired yet feasible criteria of quality is the major problem in nurse staffing research. Unfortunately, nursing practitioners and nursing administrators have not given attention to this basic problem and are often unable to identify realistic and feasible criteria of patient care. Furthermore, since nurses are unable to articulate their concerns about the lack of models, they are unable to give guidance to individuals sincerely interested in helping with staffing methodology. In none of the literature reviewed was the seriousness of the lack of models identified.

Second, in many reports using these techniques, evidence is markedly lacking that the data presented are objective, reliable, and accurate. Only a few of the studies describe the pretest of forms and data collection worksheets. Although several mention orientation and training of nurse staff and observers for data collection, few have made tests of the agreement of observers or the reliability of raters on specific features. The problems of error in recording or reporting data are seriously ignored in most studies. Problems of the accuracy of reporting are seldom discussed. Often, sample size and sampling procedures are not given. Consequently, the data presented in nursing activity measurement are open to the suspicion of being biased and incomplete.

Patient Classification Schemes

Forty-one pieces of the literature referred to a scheme to be used in classifying patients. Conceptually speaking, nursing practice and its delivery evolve from the patient population that the staff serves. The type of nursing practice, the amount, and the time and sequence of its delivery are derived from the requirements of patients. The introduction of the categorization of patients is an attempt to quantify the nursing care workload created by patient care demands.

The number of classes in the patient classification schemes described ranges from three, the most usual, to nine. The most frequently used categories are self-care, partial care, and complete care. Some studies refer to these groups as categories I, II, and III, indicating that III requires the most attention. The names given by still other authors and investigators are related to acuteness of illness and care requirements, such as minimal, partial, moderate, and intensive. The expression "variations in physical dependency" is applicable to terms used in one study *(1)* as the title of a set of classes.

In the literature, there seems to be general agreement about the variables entering into the patient classification systems:

(a) capabilities of the patient to care for himself,
(b) special characteristics of the patient, related to sensory deprivation,
(c) acuteness of illness,
(d) requirements for specific nursing activities,
(e) skill level of personnel required in his care,
(f) patient's geographic placement or status in the hospital system.

The capabilities of the patient to meet his own needs are defined by statements that attest to his ability to ambulate, to feed himself, to bathe himself, and to care for his own elimination.

Not all variables are used in all classification schemes. However, the schemes are usually developed along a continuum of requirements for nursing assistance, moving from little to great need. Items picturing the behavior of the patient and his special care requirements are ordered along the continuum. At specific points, the patient is judged to be in a different category. Most authors or investigators describe a scheme and provide a form and instructions for its use in the classification of patients.

The analysis of the literature describing characteristics of patient classification leaves four impressions. First, the schemes are almost exclusively developed along the physiological dimensions of care. Few items in the scales refer to the patient's sociopsychological behavior or requirements. Since many of the schemes grow out of acute care settings, the emphasis on these characteristics is not surprising. Second, little is reported in the literature about the precision with which patients can be classified by the methods proposed. There is a general failure of the authors to assess the degree of reliability obtained in the classifications of patients. The problems of selecting observers and training them to classify patients are almost totally ignored. Third, only one study reported an attempt to test for validity (2). Fourth, patient classification schemes, despite their limitations and imperfections, are widely used in staffing methodologies.

Quality Control

In the 182 pieces of literature reviewed there was no adequate, operationally defined, model of nursing itself. Furthermore there were no descriptions of the program of evaluating nursing care used by the departments of nursing service in the hospitals where the studies were being conducted.

Yet the most critical staffing problem element is definition and identification of the quality of the product (nursing care) and its effect upon the patient. Often, staffing is viewed as an end in itself, rather than the means to an end. Measures to determine the effect of changes in staffing upon the quality of nursing production are essential in staffing programs.

A most complicated and confounding area for study is assessment of quality. Though much attention has been given to this question, never has a completely acceptable model been devised. Research directed toward tools for assessment of nursing care is vital. Without valid and reliable tools, progress in measurement of care requirements, staffing programs, and staff utilization, lags.

The authors varied in the number of measures used to assess quality. The most comprehensive works, involving a large number of variables relating to quality measurement or the criterion problem, are those of Abdellah and Levine (*3*), Aydelotte and Tener (*4*), the Illinois Study (*5*), Ingmire and Taylor (*6*), Jaco (*7*), Lewis (*8*), Jelinek, et al (*9*), Alfano and Levine (*10*), and Wolfe (*11*). These studies, in particular Wolfe's, illustrate the difficulty in measurement and the complexity of the problem of quality determination.

Reports of hospitals using the CASH (Commission for Administrative Services in Hospitals) program suggest that something is not right with present methods of evaluation of quality, but this does not necessarily entail the conclusion that the basic concept of continuing appraisal is wrong. Instead, it leads one to speculate that perhaps the model of quality is poorly conceptualized, the variables selected are invalid, and the instrument used is lacking in sensitivity, reliability, and objectivity.

These ideas are in part derived from the progress report of the research study by Wolfe and Breslin (*12*) in their survey of eight nursing units. Four ranked high and four low, based on the rankings in terms of the quality of nursing care made by 34 head nurses, supervisors, and instructors in a medical center. The rankings of these nurses as to placement of the units on the high-low continuum of quality were highly consistent. These investigators developed a tool incorporating some of the items of CASH quality control with other items and tested the nurses' rankings. Although the findings of Wolfe and Breslin are inconclusive, the report does raise questions about the ability of the items drawn from the CASH material to discriminate between nursing units providing low quality of care and those providing high quality.

The materials describing quality measurement were for the most part disappointing. Evidence supporting validity and reliability of tools was missing in most studies. Rationales for the selection of specific items for inclusion in a measuring device were not presented. The question of the significance of the content of an item, in terms of changes in the state of a patient and his recovery, was generally ignored. It seems clear that, in spite of a few heroic attempts at research on this question, relatively little is known about quality. Continued attention must be given to the matter of describing and resolving problems of quality measurement. Of prime importance is the identification of what is to be delivered as the nursing product in the first place.

Related Variables

Some studies dealt with other variables. These did not deal with patient classification (nursing workload), measurement of nursing activity, or quality measurement. Rather they dealt with variables related only indirectly to staffing and reflecting, instead, probable use of time, effectiveness of service, or organization of effect.

These related variables have been grouped into five categories:

(a) architectual variables, such as design of units, implying travel distance, room placement, visibility of patients, and communication systems;

(b) organizational variables, including characteristics of the hospital, the introduction of new roles, redesign of supporting systems, and realignment of authority and responsibility in nursing;

(c) variables relating to nursing staff background, preparation in service programs, turnover, and internal states such as satisfaction and morale;

(d) hours of nursing care;

(e) miscellaneous variables.

Many writings discussed a combination of variables. Each work was read to learn whether it included specific findings regarding the relationship between these variables and nurse staffing prediction.

Organizational Changes

Twelve pieces of literature were specifically concerned with the introduction of the service unit manager system or other changes in supporting systems. The review of these writings leaves the reader with the impression that there is limited knowledge about the impact of these highly important variables.

One cannot, with confidence, say that an increase in supporting services will affect the amount of staff required; one can probably state that the amount of direct care to patients and standby time of nursing personnel will be increased. It can also be said that administrative variables probably have an effect on utilization and amount of staff required. Unfortunately, there is still no adequate basis for stating that under one style of administration less staff will be required than under another.

Architectural Variables

The literature search for writings concerned with architectual variables was not exhaustive. Six major reports were found that examined the effect of design, travel time required of nursing staff, or both.

The results of these six studies, four of which are major ones in the field *(13,14,15,16)*, indicate that nurse travel time does differ in types of nursing units. Three studies indicate that in the circular or radial units nurses spent more time in direct care. The general impression, although one cannot generalize because of the different settings and the limitations of the studies, is that circular units are favored by staff over the other two types of units.

No study addresses itself to the question of differences in staffing requirements. Yet a distinct impression emerges that types of units differ greatly in travel distance and time. Whether or not the distance and time required are sufficient to require more staff in single corridor or rectangular units is not known.

Nursing Staff Characteristics

A number of different variables relating to the nursing staff were found in the studies reviewed. One group of studies was concerned with nursing staff satisfaction, turnover, and propensity of nurses to leave their positions. Nursing staff perceptions of adequacy of services were considered in a number of studies. These studies are few and, even though they include two fine research reports *(3, 17)*, are too limited to permit generalizations about the relationships of nurse satisfaction to other variables. They point to relevant questions for research.

Inservice Educational Programs

The impact of inservice nursing education upon staffing requirements was not examined in most of the studies. The effect of inservice educational programs on staff performance, either on the ability to achieve greater workload or on the production of higher quality care to patients, is still obscure. There is some evidence the programs effectively increased patient contacts. However, the question, Does an inservice educational program result in great efficiency and economy of staff? is unanswered.

Nursing Hours per Patient Day

Only a limited number of research studies provide information on actual nursing hours per patient day (NHPD) and the validity and reliability of the data used in those studies are in most instances questionable. Techniques are loosely described, samples are small or ill defined, instrument testing is deficient, and rationales are weak. In most instances, information about the quality of care is derived solely from the judgments of the nurse involved. The studies vary greatly in scope and quality. Most apply only to specific hospitals. Adequacy of staff utilization was found to vary greatly among hospitals, and the hospitals varied greatly in the average number of daily hours nurses were available.

The confounding question of patient care quality arises in the examination of these research studies. This kind of assessment was ignored, taken for granted, or poorly handled. It is obvious that NHPD is less than satisfactory in staffing determination. The literature suggests that the use of guides and procedures applied to a specific hospital situation is a more logical approach.

Age and Care Requirements

Three studies examined the effect of age upon nursing care hour requirements. These three support each other's findings that the over 65 years of age patient group exceeds the under 65 years of age group in hour requirements. *Jacobs' study,* *(18)* the most comprehensive of the three, reported that the 65–74 year old group requires 21–31 minutes per day more and the 75 year and older group needs 55–79 minutes per day more. He found there was little difference between the time requirements of adult medical and adult surgical patients, and that specialization efforts of the hospitals were not factors in the amount of care required.

Control of Costs

Most of the methodological studies of staffing were highly concerned about the control of costs. However, none of the studies reviewed was successful in showing the relationship between the variables of cost effectiveness and nursing staffing. The problems of defining cost, obtaining reliable data, and isolating the dependent variable, quality, were recognized by many other authors. Two studies presented highly interesting and relevant material about the shortage of nurses, using different economic models for analysis *(19, 20)*. Both authors provided provocative pertinent data about the dilemma confronting employers and especially the public.

Staffing Methodologies

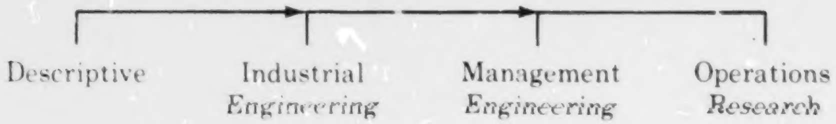
Staffing methodologies in the literature fell into four major classes:

(a) descriptive, using a number of variables, survey methods, and the subjective judgments of individuals;
(b) industrial engineering;
(c) management engineering *(21)*;
(d) operations research.

These methodologies also represent a gradual increase in the application of logic to the problem and the use of abstraction in its resolution (see figure 2).

To clarify the following discussion, the terms "methodology" and "approach" and these four classes of methodologies will be defined. The term "methodology" is used to describe a "logically and procedurally organized arrangement of steps. When formally documented or utilized, these steps may constitute a science of method for whatever discipline uses them *(22)*.

Figure 2.—Diagram of evolvement of methodologies for the study of nurse staffing; application of logic and increases in abstractions.



The first term, "methodology," is regarded as a much larger concept than "approach." The latter term is more limited in that it represents an orientation or a preliminary step and does not encompass a full methodology.

The descriptive methodology makes use of a number of data gathering devices about a large number of variables, the relationships of which are not clear. The final decision about amount of staff resides in the judgments of individuals who have a background of experience. The approach may use simple ratios, formulas, and suggested proportions between types of personnel. However, there are no consistent strategies in the methodology.

The industrial engineering methodology is directed at the study of nursing work on a nursing unit. It uses the techniques of work measurement, work distribution, task or function analysis, procedure analysis, and the like. It is primarily directed at reorganization, reassignment, and redistribution of work on specific nursing units.

The management engineering methodology, which claims to be based upon common sense, uses tools and techniques from industrial engineering and from systems analysis, and builds upon findings from operations research studies. This methodology must give evidence that the majority of the component strategies are present, although completeness of each component may vary. The component strategies include:

- a statement of performance objectives,
- an analysis of components and functions,
- distribution of functions,
- scheduling,
- training individuals for the use and testing of the system,
- installation of system,
- quality control *(23)*.

The operations research methodology is directed toward enabling one to make decisions for real life situations. Mathematical models are built to represent real life problems. The essential elements are abstracted from the situation so that a search can be made for a relevant solution to the problem. The structures of solutions are explored and procedures are established for obtaining them. The optimal solution and set of procedures are then made available.

Since authors of the pieces reviewed often utilized the same techniques, such as counting, patient classification, work measurement, and included many of the same variables, a set of arbitrary rules was drawn up for classifying methodologies. The rules established exclusive categories. The descriptive methodology is one in which there is no quantification of nursing work and no use of patient classification system. The methodology drawn from operations research requires the construction of a mathematical model.

The industrial management methodology employs methods from industrial engineering and restricts it to a study of the nursing unit. It does not include the full range of strategies seen in the management engineering methodology and does not interface the work on the unit with systems of the hospital. It does not include patient classification. The management engineering methodology must give evidence that the majority of component strategies are present, although completeness of each component may vary. It may use mathematical tools and may draw upon the research conducted by persons using operations research methodology.

These four types of methodology for the determination of nursing staff required in a hospital are described in many of the research reports, manuals, pamphlets and guides reviewed in the literature. Linkages between the work of individuals are discernible, although the times at which

Table 1.–Comparison of staffing methodologies on selected features

Title of methodology	Feasibility of approach			
	Reliability of data	Validity of data	Reproducibility of forms	Setting requirements
Descriptive	No evidence	Face validity	Some excellent examples in literature (C7, Gunn) (C14, Paetznick) (D29, Ludwig and Humphrey)	No specific requirements
Industrial engineering	Depends on accuracy of reporting, training programs, and clarity of forms. Checks provided in some reports.	Face validity	Excellent examples in literature (A47, Mergen) (D4, Bartscht) (D20, Hansen)	Industrial engineering consultants or nursing staff knowledgeable about concepts and tools
Management engineering	Depends on accuracy of reporting—routine checks are not built in, training of personnel for data collection, and necessary clarity of forms.	Face validity; relies on Connor's scheme and its modification.	Examples in literature (C19, Scottish Health Service, No. 9) (C13, Operations Research Unit) (C4, CASH, Staff Utilization) (C12, Mass. Hospital Association)	Consultant help; no specific hospital setting
Operations research	Evidence presented. Depends on accuracy of reporting.	Face validity; relies on Connor's classification.	Examples in literature (A72, Wolfe) (D46, Wolfe, and Young, Part II)	Computer; consultant help
Descriptive	Subjective judgment about value of variables	Survey methods: counting, questionnaires	Many. Examples: census data, hospital statistics, financial resources, training, nursing objectives, policies, clinical services, etc.	Broadly applicable, but relies upon experiences and knowledge of the director, the administrator, and the staff
Industrial engineering	Studies and reports from industry. Assumption made that nursing is a composite of tasks or activities	Industrial engineering	Personnel statistics, nursing care activity, and time requirements, work layout, census statistics, work distribution, and workload factors.	Various types of work measurement used. Nursing staff can make application.

Table 1–Continued

Title of methodology	Basis of rationale	General approach used	Variables considered	Comments
Management engineering	Research studies of the Johns Hopkins Operations Group. Studies and reports from business and industry using industrial engineering and management methodology. Assumptions made: that nursing provided represents quality desired, that patient classification is valid, that nursing service demands are stochastically distributed, and that standard times of procedures are valid and reliable.	Industrial engineering methods and systems analysis	(a) nursing workload by task frequency and level (b) standard time for tasks or categories of patients (c) number of patients in classes (d) supporting services (e) personnel levels skill (f) administration policy and procedures (g) attributes of quality (h) personnel data and statistics (i) age of patient (j) cost figures	Programs are purportedly designed with these components: (a) identification of performance objectives (b) function analysis (c) scheduling of personnel (d) prediction of staff allocation tables (e) training of personnel (f) quality control program (g) management control information reports
Operations research	Studies and reports from industry. Operations research by Connor, Wolfe, and Flagle. Same assumption as above.	Operations research: mathematical allocation and situation model. Queueing Theory. Industrial engineering and systems analysis	(1) classes of patients (2) 16 task complexes (3) cost values	Application not widely observed in the literature. Quality measurement recognized as not present.

they occurred are not known. Many of the writings are undated and the investigator did not attempt, by personal contact with individuals, to learn precisely when programs were initiated.

The majority of the manuals, pamphlets, and guides are poorly written. Little is included in them about rationale or assumptions underlying the methodology being described. Protocol and procedures are likewise sketchily outlined. The use of the manuals would not be possible without consultant help. Some reports of application of the methods were obtained that clarified the methodology considerably.

A comparison of the four methodologies was made with respect to a specific set of characteristics that included rationale, approach, variables, and feasibility (refer to table 1). In all four methodologies, subjective judgments are present, since nursing units selected for workload measurements are made either by individuals or by group discussions. Measurements of care quality and performance standards are weak or totally lacking in all four methodologies. Relatively few variables are considered, yielding narrow basic conceptual models, and the impact of architectural variables, organizational variables, and specialization efforts is almost totally ignored. No attempt was made to predict the number of persons required for major position categories in the nursing care delivery system. Validity and reliability of the data are questionable.

Except for a few reports applying the methodologies, tests for accuracy in reporting the data and the training of observers are not proposed. Validity of the data resides in the judgment of nurses selected to work with the methodologists. All four methodologies are applicable to a variety of health settings. Two types of methodologies require consultants in their use. Forms employed in recording tasks are incomplete, and standard times reported for task performance are not documented. The classification schemes used in two of the methodologies are drawn from Connor's (*24*) basic research.

Summary of Literature Search

The results of this literature search have been sobering. We can say that we know little. However, there are a few generalizations we can make in a summary. First, nursing activity can be measured by standard methods drawn from the discipline of engineering. The techniques are feasible and, if appropriately applied, provide reliable data about work that reflects nursing as it occurs in current practice. However, the tasks, activities, and categories appearing in the literature do not, in my opinion, reflect the nature and full character of nursing practice, but only a portion.

Second, most patient classification schemes are modifications of that proposed by Connor who in his dissertation provided an admirable rationale of classification. However, most of these classification schemes have not been tested for reliability of the data they produce. The evidence of validity presented is weak. Although the variables used for classifying patients are fairly universal, the number and kind are limited and some requirements of care are either overlooked or ignored. Further, questions can be raised about the significance of some of the items included in the scales. Do they reflect states of recovery and the objectives for which the patient is in the health care delivery system? The relationship between patient classification schemes and nursing workload has been best handled in the research by Connor *(24)* and Wolfe *(11)*, especially the latter. However, the knowledge we have about the combinations of nursing personnel and their ability to mount a workload arising from a particular mix of categories of patients is little.

Third, a large number of variables appears to influence the work of a nursing staff. Again, we know little about the effect of the interaction of these. The impression one derives from the literature is that the admission and discharge process of patients, the environmental structure of the unit, the supporting systems, the capabilities of the nursing staff, and the clinical nursing leadership are major factors to be considered. Few pieces of the literature reviewed referred to the impact of the philosophy and practice of medical staff, their number, their presence, or absence. Yet I predict that the physician and his behavior will prove to be a prime variable in the creation of nursing work.

Fourth, four types of staffing methodologies were identified. These all are feasible and are widely used. The concept of variable staffing is adopted in many institutions.

Fifth, quality measurement is poorly handled in nearly all the studies. In large part this is due to the failure to describe in operational terms the product to be produced.

Sixth, there exist in the literature no adequate descriptions of models of the nursing care delivery system and nursing practice. The majority of studies give little theoretical structure as a basis for investigation.

Problems and Issues

This review of the literature leads to the conclusion that our knowledge about nurse staffing is very limited. The number of variables with which one must deal is large. Furthermore, many of them are almost incomprehensible and, for the most part, appear to defy description and quantification. There is little agreement in the literature on the nature and characteristics of some obviously important variables: nursing practice, patient needs, quality of care control, complexity of care, intensity of care, and levels of practice.

Review and assessment of the literature not only point up how little we know of the subject but also force our attention on the central problems and issues relating the nurse staffing methodology. Nowhere in the literature was found a well developed model of the nursing care delivery system for use in the development and examination of staffing. The term "model" is used, in this sense, to refer to an analogy of the pattern of relationships observed in the nursing care delivery system.

The problems of model construction are exceedingly troublesome. First, there is the question of setting the boundaries of the model. Will the boundaries be those of the nursing unit, as they are in

Jelinek's *(25)* and Wolfe's *(11)* writings, or will they include parameters beyond the hospital, as implied in the Illinois Commission Study (*26,27*) and Levine's (*28*) study of Federal and non-Federal hospitals? Second, how many variables can be adequately explained and managed in the model? The problem of identifying relevant variables and eliminating irrelevant ones is extremely complex. Knowledge about the variables and their relationships is vague and measurement of some of the variables is almost impossible.

Nurses who have been within the real work world would undoubtedly identify three groupings of variables:

(a) selected factors external to the hospital influencing nursing delivery, such as nursepower pool, financial resources of the clientele, and the health status of the personnel;

(b) components of the hospital system, such as patients, medical staff, management, financial resources, supporting services, traffic patterns, nursing leadership, qualification of staff, staff productivity, and staff stability;

(c) independent factors that can be used to determine the effectiveness of the system, such as patient satisfaction, patient behavioral changes, and efficiency of services.

Some good ideas are found in some writings. However, thoughtfully conceived and carefully written descriptive models are greatly needed.

The second major problem confronting staffing methodology development is the difficulty of identifying in advance what the patient or group of patients is entitled to receive as the product, *nursing care*, for which they are paying. The fundamental reason for assembling a staff is to take care of the patient

Identifying the components of care a patient must receive is essential to any staffing methodology. The arrival and discharge times, the hourly and daily variation in the patient's requirements, the medical programs and scope of medical practice, the training programs, the problems of measurement of quality, and the lack of an operational definition of care itself make the problem of measurement formidable. None of these items were adequately treated in the literature, and some were totally ignored.

The assumption made by the present methodologists is that, at the time of the survey, what is provided for the patient is sufficient. Therefore, the present classification systems have examined physical elements of care or activities performed and have accepted them as requirements for care, without giving adequate thought to the question, What does the patient *truly* require? There is no empirical evidence to support the assumption that what the patient is getting is all that he requires or is necessary for his recovery. In fact, there is some evidence that what he is getting is given as a matter of ritual.

The majority of patient classification schemes reflect specific nursing tasks, a number of which arise because of medical order and acuteness of illness. The schemes do not reflect emotional needs, orientation of the patient, instruction needs, and comfort, other than through the process of providing physical care. Few have even attempted to include these items. No scheme, for example, has been built upon the nursing problems of the patient, although several investigators began with this intent. Yet, experienced practitioners in nursing can set a priority ranking of nursing problems and combinations of problems that would reflect both amount of time and professional knowledge base and skill required for performing the care to solve the problem. Only one study reported the reordering of priorities of nursing care as a result of the admission of a critical patient.

If one assumed present patient classification schemes valid, another problem exists. Except for one study, patient classification schemes have not been rigidly tested and have not been used in a variety of different settings in a way that would indicate how reliable they are. Connor's scheme was designed for a large medical center and only one formal test of it was found in the literature. Is it equally applicable to medical-surgical patients in a small community hospital? What is the reliability between raters?

If properly used, the various methods for studying nursing work are feasible, reliable, and simple. The problems are those of sampling, of selecting model units for survey, of establishing categories that represent major nursing functions, and of the limitations inherent in the use of the method. What is most questionable is the assumption that what is being observed is desirable. Further, the categories used often do not reflect the planning and thinking time required if nursing is perceived as having an intellectual base. The selection of a model unit for study to make staffing predictions is critical. The management engineering reports indicate that the selection of the unit rests upon the judgment made by an advisory group composed of nurses and hospital administrators. It appears, however, that this judgment is usually not based on hard data, reflecting the achievement of a specific quality of care, evaluated by well defined criteria.

Another problem in nursing measurement is grouping tasks or categories into complexes for further research on staffing methodology. It is extremely difficult for some nurses to perceive that personal services to patients may not be necessary, feasible, or economical. The use of expensive professional time for simple tasks, repetitive but personal for the patient, is overuse of skill and talent. But this statement is unacceptable to many nurses.

These nurses state that use of auxiliaries depersonalizes nursing care, that these personal tasks may serve as vehicles for nursing action, and that the elimination of personal care from registered nurses' repertoire of duties is unwise. The crux of the argument is not whether it is personal or not, but what is the knowledge and skill requirement for its performance and how does this affect patient recovery? It is uneconomical for registered nurses to spend time on giving nontherapeutic care to patients. We should ask what registered nurses are doing for patients that no one else can provide and what they are not providing.

The ultimate test of a staffing program, or any nursing activity, is the progress of the patient, not the quality of performance of the nursing staff, the appearance of nursing units, or the completeness of records.[2] The amount of time spent with a patient, the skill with which a particular procedure is performed, the number of times a patient receives a procedure, the number of times the patient has contact with the nursing staff, the flow of communications, the results of a nursing audit, or even patient satisfaction are inadequate criteria for the evaluation of the quality of nursing care the patient has received until the *relationship between these factors and the progress of condition of the patient has been established.* It has generally been assumed that a positive relationship exists between certain accepted nursing practices and the patient's condition. The evidence to support most of these assumptions is meager, particularly when applied to a total nursing unit rather than a select group of patients.

The major reason the relationship between nursing activities and patient condition has not been generally determined may be the problems involved in the development of patient condition criteria; i.e., identification of what one must observe in, on, or around the patient to determine whether the nursing care he is receiving is beneficial to him for his present and future status. It is time the question of the construction of criteria be squarely faced.

The measurement of nursing care quality and the establishment of performance standards cannot be accomplished until nursing practitioners and leaders in nursing practice give attention to the development of such criteria. The primacy of the problem is apparent. The questions to be asked are these: Where are the practitioners who can develop stated criteria? How can the criteria be built into an ongoing program of quality measurement? What modifications are required of the ongoing program to build scales or indices which can be used at specific points in time for research purposes?

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[2] Acknowledgment is given Dr. Marjorie Moore, Associate Director, the University of Iowa Hospitals and Clinics, for the following paragraphs.

Future Research Direction

Although the problems and issues reviewed are almost overwhelming, I am confident progress can be made on their resolution. First of all, nurses knowledgeable of nursing practice and intimately acquainted with the real work world of nursing care delivery systems should be sought, encouraged, and supported in the development of conceptual models of the nursing care delivery system. This is no easy task. Furthermore, these individuals should be encouraged to seek out and collaborate with individuals from other disciplines.

Second, carefully designed research studies testing present classification schemes should be conducted. Since limited evidence appears in the literature that these schemes are providing reliable data, carefully controlled tests should be made of the schemes in a variety of hospitals. The external factors that influence the character of the patient population should be identified as fully as possible.

Third, patient classification schemes built around nurse perceptions of care should be built and tested. These schemes should be based on reasonable care requirements as nurses see them. The present schemes do not reflect omissions of care that may be serious; on the other hand, omissions may not be important. However, the recommendation is that proposed schemes for the classification of patients indicating nursing loads be developed by knowledgeable practitioner nurses. These schemes should be established around nursing problems and should reflect nursing priorities, knowledge, and skill level. The scheme should lend itself to computerization. It should be based on data used by the nurses in assessing patient care requirements.

Fourth, since the effect of improved supportive systems upon nursing staff requirements has not been well documented, controlled studies of the effect of improved delivery and retrieval systems and placement of patient care items, equipment, and supplies should be conducted. Holding quality constant, what is the effect of improved availability of work materials and tools for patient care upon the size and kind of nursing staff required? What is the effect upon cost?

Fifth, a concentrated attack on measurement of quality must be made. From the review, the impression is that attempts are too global. Except for a few instruments, not much is available to assist the director of nursing and the hospital administrator in making estimates of quality. The evaluation must relate to the effect on the patient. Therefore, different sets of criteria may be needed since the patients in the hospital vary. The patient variation is dependent upon the purpose for his being in the hospital, the progress he is making, and the course of his recovery. Development of these criteria will require the involvement of expert nurse clinicians.

Sixth, guidelines for use of the four specific methodologies should be developed. These guidelines should state the rationale upon which each is based, the variables studied, the limitations of each, the appropriate use of the methodology, the component strategies, and the procedures. It should include examples of well developed forms, reports, the guides for use of allocation tables, if included, and the like. The value of the methodology as well as its limitations should be stated. The importance of concurrently studying supporting systems, or even preceding the analysis of nursing with a study of these, should be emphasized. Proper utilization of supportive services and expectations of adequate service from them should be made clear.

Seventh, guidelines for new methodologies should be explored, greatly enlarging the variables considered. The methodology should be based upon a carefully described conceptual model of nursing care delivery. It should provide guidelines that will take into account providing for omissions of care as well as eliminating repetitions of care, the organization of the work of nursing personnel, and the sequence of its delivery.

These seven recommendations are specific proposals for research. My final comment is a general one but one which I am convinced is of major importance. Research on these seven must be multidisciplinary—the discipline of nursing must be involved. Mechanisms for sharing research findings must be set up and knowledge systematically built. To achieve this end, we must address attention to the structuring of theoretical frameworks for the research on staffing of nurse delivery systems.

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Factors Related to Nurse Staffing and Problems of Their Measurement

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Introduction

Looked at in any way, the problem of staffing hospital nursing units is profoundly important and profoundly difficult. In economic terms alone, we are dealing with several billion dollars in wages each year in the United States, something on the order of 10 percent of all medical costs, and a fourth of hospital costs.[1] Little wonder then that nursing care is a focus of attention, not only in its formulation and distribution of tasks, but in the criteria for admission and discharge to inpatient care. Throughout our discussion we should keep in mind that the total cost of impatient nursing care to a community is the product of the cost of nurse hours per patient day times the total number of patient days. The total number of patient days of care may be more subject to control in the health care delivery system than the resources used in a day of care.

In social terms, we have lived through a foreshortened transition from a vocation expecting much personal self-sacrifice to one bearing considerable resemblance to the way of life and affluence of other skilled purveyors of human services. Changes in attitudes and images have accompanied this transition—the secularization, if you will, of patient care. The tangible correlates of these changes have been such things as shortened and more formalized working hours for nurses, higher wages, unionization, occasional strikes, and in the auxiliary positions an undeniable demand for ethnic equality and upward mobility in jobs.

Interwoven with all the economic and social changes affecting the organization for patient care, there has been an unending series of technological developments—physical technology and medical. Intensive care units and life islands, for example, have imposed demands on nurses for increasing specialization.

In the face of all this change, heaped upon the inherent difficulty of caring continuously and simultaneously for 30 or so sick people in a nursing unit, it is little wonder that a great deal of administrative and research attention should be centered on the staffing problem. Determining who should be where, when, and doing what, is a problem deserving all the attention it has had. Judging from our accomplishments to date, one might suggest that even more or broader effort should have been expended through the years.

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[1] M. Y. Pennell and David B Hoover, in *Health Manpower Source Book* Section 21, "Allied Health Manpower 1950–80, Public Health Service," (Publication No. 263, 1970) project present total nursing and related sources from two million employees at present to three million by 1980, roughly one-fourth being registered. The Commission of Health Manpower, 1967, estimated 60 percent of the total are employed in short-term general hospitals.

But I am concerned that, for all its importance, a focus on the mechanisms and decision rules for assigning personnel of various skills to groups of nursing tasks will obscure larger issues. Such a focus will certainly obscure the real emphasis of much of the research carried out during the 1960's. If I may speak reminiscently of our own experience at Johns Hopkins, I can only capture the whole story by saying that from the outset we were hopeful of developing a rational system of inpatient care, considering all resources, human and physical, as potential elements of that system. If nurse staffing received special emphasis it was because of the dominant aspect of nursing shortages and personnel turnover.

In those days there was an abundance of patients, doctors, and beds, a growing army of administrators and ancillary specialists, a stream of new equipment and labor saving devices, and a progressive shortage of nurses. It was to correct or compensate for that shortage that hospital administrations sought innovations. However, in the process, new strains were imposed on nursing personnel, for although substantial assistance did come from the centralization of such support services as sterile supply away from the nursing units, new problems of communication and coordination were created as a consequence.

Seeing the nurse burdened with a residue of nonnursing tasks and simultaneously obliged to play a large role in ensuring the logistical support of her unit, research took a new direction. Seeking on one hand to introduce more new technology, more external support, researchers attempted to restore and improve upon the cybernetic integrity of the nursing unit, which had existed in the days of internal self-sufficiency by creating new mechanisms of communication and coordination.

Think of a nursing unit in those terms. Its elements are its patients, set of doctors, teams of nurses, physical setting, and supporting services. The goals of the nursing unit reflect the goals of the larger institution of which it is a part. Care of its patients, training of its physicians, nurses, and other personnel, perhaps some research—all these are the stated objectives of the unit. To understand the behavior of the actors in the hospital inpatient unit, one must also be aware that individuals may be guided by professional values quite apart from the immediate demands of the work setting or the formal goals of the institution.

To gain insight into the complex processes of patient care, various investigators have constructed models. Daniel Howland,[2] for example, has proposed the concept of the nurse-patient-physician triad as a subsystem whose objective is the maintenance of homeostasis in the patient, and whose illness is seen as the inability of his own subsystems to maintain homeostasis. How well the physician and nurse perform—the quality of their care—is evidenced by the promptness of their decisions and actions in restoring physiological norms.

Given the diverse responsibilities of the physician and nurse in the simultaneous care of many patients, traditional roles have evolved for each. Though time has changed their roles somewhat, one can still identify formal functional relationships. The nurse has continuous custody of the inpatient and, through the physical design of the nursing unit, has the capacity for continuous observation or awareness of the state of the patients. The physician sees patients intermittently but is responsible for signaling actions to be taken on the patient's behalf. Thus the activities of the nurse are responsive to two sets of signals, one from her own communication and observation of the patient's conditions, the other from the set of physicians' orders, which she may have had some influence in shaping.

An examination of the whole nursing unit as a set of triads of patients-doctors-nurses devoted to maintaining homeostasis in individual patients does not reveal anything corresponding to homeostasis in the nursing unit itself. There is in fact no constancy, no convenient norms to be maintained. Instead there is a constantly and widely changing pattern of aggregate patient needs. The cybernetic system problem is to formalize the process of observation and respond in such a way that resources and skills can be called forth over the course of time in amounts appropriate to the level of need.

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[2] See the series of papers by D. Howland and W. McDowell in *Nursing Research*, 1963 and 1964, and *American Journal of Nursing*, 1966.

In quantitative terms, this means matching two erratic and not very controllable variables: the aggregate hours of direct patient care elicited (the direct care workload), and the total number of nurse hours available to render care. The nature of the problem can be seen in figure 1, which is a routine daily forecast of nurse hour requirements for a set of nursing units, a statement of scheduled hours for the day, and a gross estimate of the expected shortage or overage of personnel on the units.[4] It is usual for the workload index to vary from 15 to 45 nurse hours on 30-bed units, while the total nurse hours available range from 35 to 37.

What causes these variations? To what extent are they controllable and whose decisions and actions are required to exert such control? How are the vagaries of patient needs and available personnel interrelated to arrive at nurse staffing practices? Consider first the demand factors related to patients.

Patient Characteristics as a Factor in Staffing

On any given day, direct care activities in a nursing unit are dependent on a number of aspects of the patient population that day. These may include the following:

(a) the total number of patients in the unit,
(b) the physical and psychological dependency of patients on nursing support,
(c) the content and sequencing of physician orders,
(d) day of stay of patient,
(e) legal requirements and hospital doctrine.

Total Number of Patients in the Unit

Although mere presence as a patient is not a major determinant of workload, it does require a set of activities, a flow of visitors and inquiries, the maintenance of records, communications, and preservation of the nurse-patient relationship.

Dependence on Nursing Support

Much of the practical outcome of the nursing research under review assumes that measures of patient dependency are adequate bases for predicting nursing needs. Dependencies have been relatively easy to define and observe objectively and such measures, or the patient classification associated with them, do correlate empirically with patient care as rendered. The weaknesses in using dependency classification alone for staffing determinations are several. In particular they do not indicate time of day of required actions, and they force generalizations of past experiences to the present and future. Their virtue is that they are an easily obtained signal of abnormally light or heavy demand ahead.

The Content and Sequencing of Physicians' Orders

Much of what nurses will do on any given day may be inferred from the set of physicians' orders in effect for that day. The paper by Dr. Simborg (*1*) to be presented at this conference demonstrates the usefulness of orders, not only in estimating total workload but in phasing nurse activities throughout the day. The measurement problem in using physicians' orders as a guide to staffing lies in the transformation of an order into a set of tasks for which there are nurse times associated.

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[3] See Flagle, C. D. "A Decade of Operations Research in Health," in *New Methods of Thought and Procedure*, Zwicky, F., and Wilson, A. G., editors, Springer-Verlag, 1967. The hospital organization chart is depicted as a set of physician-patient relationships, with line delegation to nursing and the remainder of the hospital as staff support.

[4] Connor, R. "A Work Sampling Study of Variations in Nursing Workload," *Hospitals*, May 1, 1961. It would be difficult to defend the accuracy of the fixed or variable nurse hours (figure 1) transferred to another service, 10 years later. Nevertheless, similar work studies elsewhere confirm the approximate magnitudes, and the estimated gap between projected needs and resources is a useful signal for necessary action.

Figure 1.—Calculation of nursing staff needs.

Date 8/28/70

Building Woman's Clinic

Floor	Census	Degree of care required			Index †	Load ‡	Hours scheduled ‡			Hours scheduled-load	Correction for change since 2:30 p.m.	Staff hours: surplus (+); shortage (-)	Desired addition or subtraction	REMARKS
		Total - III	Partial - II	Self - I			Pro	Aux	Total					
A_2	24	9	4	11	32	52	15	18	33	-19	-1	-18	+1RN	
2 L E R	9	0	0	9										
A_3	18	5	2	11	20	40	9.5	15.5	25	-15	-2.5	-13.5	+1RN	
B_2	21	5	2	14	21.5	41.5	15	21	36	-5.5	+15	-20.5	+RN +1Na	-6 hrs. Na ÷ To B2 R
B_3	23	7	2	14	26.5	46.5	15	18	33	-13.5	+2.5	+1	—	-
A4 B4	17	2	3	12	14	34	21	18	39	+5	+3.5	+1.5	—	
Totals	104	28	13	62										

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† at 2:30 p.m. ‡ 9:00 a.m. - 6:00 p.m.

Figure 1 (continued)

Date 9/24/70 Building Woman's Clinic

Floor	Census	Degree of care required			Index †	Load ‡	Hours scheduled ‡			Hours scheduled-load	Correction for change since 2:30 p.m.	Staff hours: surplus (+); shortage (-)	Desired addition or subtraction	REMARKS
		Total - III	Partial - II	Self - I			Pro	Aux	Total					
A_2	21	8	5	8	29	49	21	15	36	-13	-0.5	-18.5 -12.5	+1RN	-6 hrs. RN (To A-3)
Q3LER	11	0	0	11										
A_3	17	0	2	15	9.5	29.5	21.5	9.5	31	+1.5	-0.5	-4 +2	/	-6 hrs. LPN Ill -6 hrs. PN Ill +6 hrs. RN (from A-2)
B_2	22	2	0	20	15	35	9	21	30	-5	+14.5	-15	+1RN +	-6 hrs. RN (Ill) +6 hrs. RN (O.T.)
B_3	21	9	1	11	34	54	18	21	39	-15	+6.5	-18.5 -21.5		-6 hrs. RN Ill +6 hrs. RN called back from home +3 NA (from B-2-N)
A_4 B_4	19	2	3	14	15	35	21	18	39	+4	+7.5	-3.5		
Totals	100	21	11	68										

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† at 2:30 p.m. ‡ 9:00 a.m. - 6:00 p.m.

Day of Stay of Patient

Evidence continues to accumulate to quantify the difference between first day of stay in a hospital and subsequent days. Moores (*2*) reports a halving of direct care after the second day. A corollary is the statement that nurse hours per patient day vary inversely with a hospital's average length of stay, but this statement obscures the explanation of significantly large transaction times related to admission and discharge days.

Legal Requirements and Hospital Doctrine

Society imputes certain characteristics to hospital patients and to those who serve them. As a result some mandatory staffing practices have significant influence on staffing ratios. Registered nurse coverage during the night and preparation and administration of drugs by professional nurses (RN) are examples. Assessing the effects of such requirements does not pose severe measurement problems. Work measurement studies of the activities and frequency of performance estimates suffice to show the magnitude of these factors.

Organizational Response as a Factor in Staffing

Given the set of responsibilities resultant of patient conditions, physicians' orders, legal requirements, and nursing doctrine, we can address the problem of organizational response as it affects staffing. A number of measures may be used to characterize staffing; e.g., the familiar ratio of nurse hours (or nurse wages) per patient day and budgeted or total staff positions per bed.

Some of the rational determinants of these numbers are as follows:

- size of the nursing unit,
- mechanisms of communication and control unit,
- external supports of the nursing unit,
- architecture and technology,
- organizational factors,
- administrative policy.

Size of the Nursing Unit

In any service system subjected to randomly variable demands, a reserve of resources must be provided to accommodate periods of peak load. The statistical law of large numbers tells us that for any specified probability of available service the necessary reserve capacity is proportional to the square root of the capacity required for average demand. By way of example, the reserve for peak demand in a 16-bed intensive care unit may be half again as large as the base staff. This argues for larger nursing units to achieve economies of scale, although there are other ways to handle the problem of random variation in workload. Moores (*2*) reports a smooth drop in staffing ratio from over four nurse hours/patient day in units of 10 beds or fewer to 2.5 or less for units of 30 to 37 beds.

Mechanisms of Communication and Control

From an administrative point of view, the simplest way to determine staffing requirements for a nursing unit of given size and service is to observe its pattern of patient demand over a period of time and assign staff to meet observed peak loads. This is an easy but costly process leading to large amounts of idle time. Given some mechanism for short term prediction of patient needs, say a day in advance, several arrangements are possible each of which in its own way permits accommodation of peak loads without a large reserve staff.

Progressive patient care.—By grouping patients according to level of intensity of illness or dependency, the variations in demand within each group are relatively less than the variation of a nursing unit in which all levels of intensity are randomly mixed (3).

Variable staffing.—It has been observed that the major source of variation in aggregate patient demands on any day is the number of intensive care patients in the unit, followed closely by the number of admissions. Given short term forecasts of each of these numbers, it is possible to predict roughly the number of direct care hours needed. It has also been observed that workloads in the many nursing care units of a hospital are not correlated, except for seasonal variations or epidemics. Again, the law of large numbers suggests that the ability to share personnel among nursing units can reduce staff requirements, or conversely, can increase the probability of local adequacy of staff given a fixed total hospital staff (*4*).

Controlled admissions.—It was noted earlier that the first day of patient stay, particularly for nonelective admissions, imposes more than twice the demand on nurse staff than do subsequent days. Given some choice in placing a new admission plus knowledge of the number of intensive and first day patients on each unit, there is a potential for stabilizing workloads by selective admission to units. Theoretically, controlled admission can have the same effect on staffing requirements as progressive care or variable staffing. In practice it has had some drawbacks:

- In teaching hospitals, the criteria for patient placement by service and type of care narrow the options for localizing any particular patient.
- Even with controlled admission there are still substantial variations in workload, calling for variable staffing as well to match aggregate demands to nursing resources.

Variable work routine.—In searching for a pool of nursing time to draw upon for peak patient demands, one should keep in mind that direct care constitutes only about one-third of total nurse staff time. A priority ranking of activities of the remaining two-thirds may give clues for combining daily forecasts of patient needs with other tasks to create daily routines in some detail. The detail involved is immense, but it can be aided hopefully by computer based information handling procedures.

External Support of the Nursing Unit

There have been numerous studies and administrative moves to transfer some tasks traditionally performed by nurses to administrative departments in the hospital or to externally purchased supplies or services. The same arguments for economies of scale that support the notion of large nursing units also point to efficiencies in managing housekeeping, dietary, escorting, and sterile supply functions. It is simple enough to measure the bits of nursing time released by each elemental task supported or removed, but it is very difficult to find an influence on the staffing ratio. In part this is due to the fragmented nature of the time released. In part it reflects that the aggregate of such time savings may be outweighed by the admission of one or two intensive care patients.

Architecture and Technology

The comments above apply equally well to architecture and labor saving technology on the nursing unit. Specific elements of time saving can be demonstrated, but it is difficult to trace the elements to a justifiable reduction in staffing ratio. A primary effect of architectural layout is on transit time of nurses in the course of their duties. The measurement technique called "link analysis" is quite useful for observing the intensity of traffic between important nodes in the unit. Having identified the busy links it is often possible to shorten them by making the nodal points contiguous.

Various studies have shown transit time reductions to be effected by placing medication rooms and critical patient rooms close to the nursing stations. A work corridor has been shown to halve transit times if nursing teams remain in the corridor and near their patients.

Technology, in its accustomed role of lifting the burden from man's back, has had little to offer nursing. It is most effective in taking over routine, repetitive tasks, and these are generally scarce in human services. The promise of technology, as yet unexploited, lies in its potential role as part of the communication and control process. Indeed the only service areas where technology has made contributions to productivity comparable to those in industry and agriculture are those in which a large amount of paperwork is involved. We know that formal communications on a nursing unit account for as much time as patient care itself. Serious efforts are under way to recover some of this time through computer based systems, but these are in difficult development stages.

Organizational Factors

In its heyday the high productivity of American labor was attributed to techniques of specialization and division of labor. The notion of dividing a total task into elements and assigning each element to a well trained well equipped worker underlies most of our mass production techniques. If tasks can be balanced and machine paced on a precise schedule, such a system can be nearly 100 percent efficient in utilizing its man days in the short run. It is, however, vulnerable to interruptions and becomes costly when used to less than its capacity.

In a way, specialization and division of labor are consistent with the guild system, in which minor tasks were handed to apprentices with major tasks reserved for masters. If the apprentice wearied of the menial tasks assigned him, he could comfort himself with the thought that the very process assured that one day he would be a master himself. It has been this way with bricklayers and plumbers, lawyers and doctors, but not with the nursing staff. In the absence of both upward mobility of auxiliary workers and the tightly controlled set of operations on a nursing unit, one wonders whether a hierarchical distribution of tasks can be efficient or effective in the long run.

One alternative to the hierarchical distribution of tasks is to require versatile performance by most members of the team. Indeed in two experimental units in the San Francisco Bay area, the Kaiser Foundation Hospitals have demonstrated a reduction in staffing ratio from 6 to 4 nurse hours per patient day by assigning full care responsibilities of groups of eight patients to each staff nurse assisted by nursing aides. An assessment of the hierarchical versus versatile approaches to nursing care poses difficult measurement problems for what must be captured lies in the subtle dynamics of performance of a sequence of tasks by more than one person. Nevertheless the most significant influences evident on nurse staffing are in the area of organization of tasks, where the issue is specialization versus versatility.

Administrative Policy

The variables discussed so far may be rational but they are not powerful. All can be thwarted by noncompliance on the scene of patient care or by administrative fiat. An administrative decision to base nursing budget on a rule of thumb, say 3.2 nurse hours per bed day, assures that the only variable having an influence on staffing ratios is occupancy rate. Under such circumstances the total cost of nursing to a community would be strongly related to the number of hospital beds constructed.

Empirical Evidence of Factors Affecting Nurse Staffing

In an attempt to assess the influence of many of the factors discussed here on nurse staffing, a sample of 31 Illinois hospitals was studied (5). Means were devised to measure such variables as hospital size, nursing unit size, architectural configuration, degree of external support, management factors, state of technology, patient satisfaction, staff and administrative characteristics. No efforts were made to control these variables, but correlations were sought between their natural ranging and the observed range of 3.78 to 5.50 in the dependent variable, nurse hours per patient day. The strongest relationships were found in those variables related to physical plant. The larger nursing units and the larger hospitals operated with smaller staffs in terms of nurse hours per patient day. Also, those nursing unit designs that required less nursing travel to perform duties operated with fewer nurse hours. Patient satisfaction also appeared more related to environment (noise, ventilation, comfort) than to nursing care.

Variables of a day-to-day nature, such as mix of intensity of patient dependency, even with the attempts to accommodate this variable by provision of an intensive care unit, did not correlate with nurse staffing ratios. Whether there is an inherent weakness in many of the variables we have postulated or whether the administrative process is inadequate to take advantage of them is not revealed by the Illinois study, but the questions raised demand further inquiry.

Another View of the Nurse Staffing Problem

One emerges from the foregoing considerations overwhelmed by the weight of it all. So much effort has gone into research related to nurse staffing, so many ideas have been espoused, and so little can be prescribed as a result.

If the problem of nurse staffing in hospitals were not such an old one, we might have begun on another tack, asking fundamental questions about the objectives of the health care system and the possible roles of nursing in achieving those objectives. We may find an optimal balance among preventive care, ambulatory, and inpatient care that would diminish the total number of inpatient days of care. One signal of success in achieving such a balance in the large system would likely be an increase in nurse staffing ratios and per diem hospital cost, as outpatient care is substituted for some hospitalization.

We have the opportunity to ask in some detail what the beliefs, aspirations, and goals are of various segments of society relative to health care and hospitals. If we wish to confine our considerations to hospital care, we can do so after visualizing the hospital's goal in a larger system and forecasting the characteristics of the inpatient census. Surely there will be inpatients, and we can begin by asking their wants and objectives. What are the objectives of administrators, physicians, and nurses themselves? Are some of the objectives conflicting? If so, how is the conflict to be resolved?

A well stated objective should imply measures by which one can test the degree to which the objective is achieved. We have dealt with staffing ratio as a measure of effectiveness in nursing care. What objectives does it reflect, or more important, what objectives does it fail to reflect?

If it is possible to list a coherent set of objectives and their associated measures of effectiveness, a next step in systems analysis is to ask what variables affect these measures of effectiveness that can be regarded as outcome variables.

We seek a definitive list of two kinds of input variables: controllable and uncontrollable. We must then estimate the influence of each of the input variables on the outputs. This is essentially what we have been doing in a limited way in this paper and in the research it describes. If as a result we had, over the years, produced an adequate supply of nurses who were happy in their jobs and who, along with physicians, administrators, and patients themselves, were satisfied with the care rendered, then no more need be said of objectives and variables other than those we had been considering explicitly. But the fact is that many objectives are still to be achieved. We still are not able to specify an ideal nurse staffing ratio. The factors we have considered have not been shown by themselves to explain or control the staffing ratios experienced. We must continue our inquiries and experiments to bring to bear new knowledge on the old and deeply human problem of nursing care.

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DISCUSSION OF DR. FLAGLE'S PAPER

Discussion Leaders

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Dr. Barr

Good morning, Madam Chairman, Ladies, and Gentlemen. It is always a great pleasure for me to listen to Dr. Flagle, and I am happy to comment on his paper. If I may use the blackboard, I shall use my 5 minutes this morning to draw you a diagram (see figure 1) illustrating a research framework into patient care and nurse staffing in hospitals. This gives me an opportunity of indicating some of the things we have been doing in Oxford, and I hope it also illustrates that there isn't a very wide divergence between our thinking in England and the thinking here today.

Our basic problem, or the one we think we have—let's start that way—is to define hospital staff complement. As far as we are concerned in the United Kingdom, we have tended to look at this in two separate ways. First of all there is deployment of staff and, in particular, deployment of nursing staff. This can be divided into two separate areas of research. One of these is training—training of nurses or training of any staff, and the other is allocation of staff to the jobs.

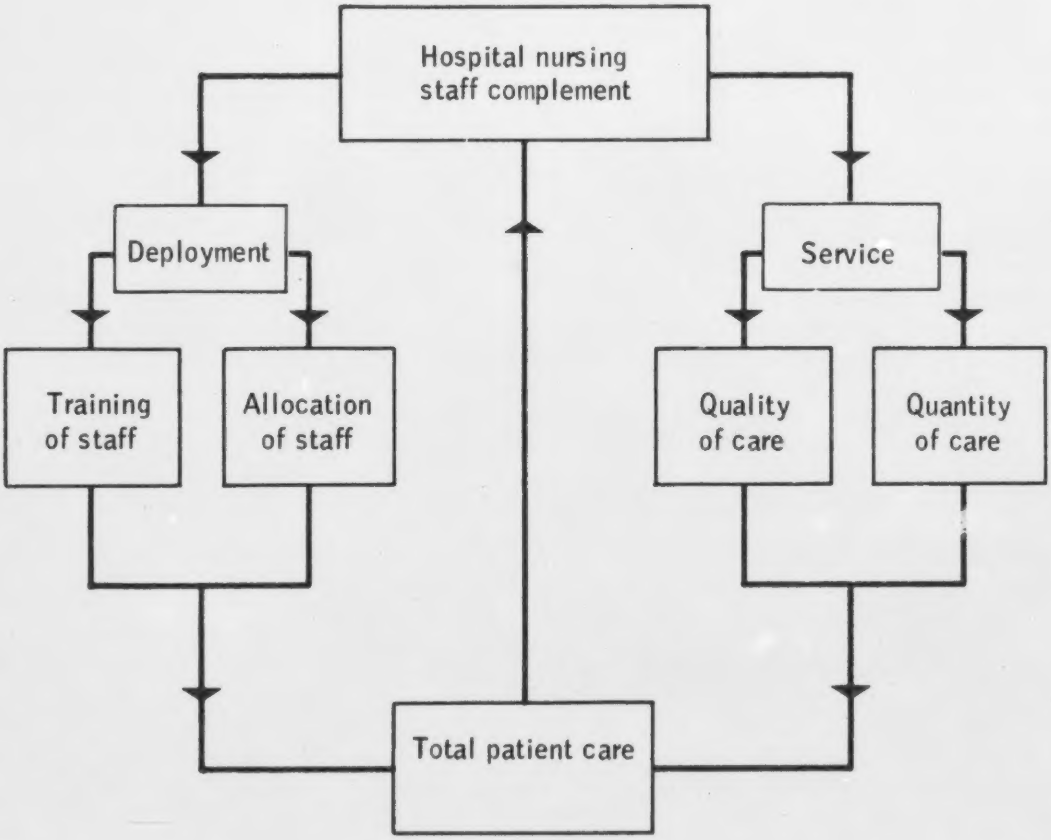
On the other side we must look at the service element, the actual running of the hospital and the delivery of care to the patients. This also has two branches. One of these is the quality of care that we want to give. The other is the quantity. We have already heard something about quantity and quality and been given to understand that the bridge between them is a bit flimsy at the moment.

Research is going on in each of these areas, but there is a certain amount of speculation as to where we go in the future. Hopefully, these various elements, research components, will somehow write them into a special box that we will have to look on at the moment as a black box of total patient care. If we could define this black box, the research framework could be drawn with greater confidence. The real danger is that in our striving for efficient organization the real business of patient care will get overlooked or given a low priority.

Let me tell you a story about an American general, which may help to illustrate the sort of relationship I think we have gotten ourselves into. An American general was supposed to have had a problem in Vietnam. As is usual nowadays, he asked a large computer in the States to solve the problem for him. We don't do our own thinking nowadays; we ask a computer to do it for us. The general cabled the computer and said, "I'm surrounded on the north, south, east and west. What should I do?" And the computer cabled back and gave him the very terse reply, "Yes." Nothing else, just, "Yes." And the general became a bit irritated at this and he cabled back to the computer, "Yes, what?" And the computer returned the reply, "Yes, Sir!"

How can the problem be defined in a way that it can be answered intelligently? I rather suspect that we have done much of the research because it

Figure 1.—Interrelationship of staffing and patient care.



is relatively easy to do. Topics are selected because we can, in fact, get solutions to them, and it always looks better to have some sort of a solution in hand. However, as I have already pointed out, perhaps we should have been asking a different type of question. What do we want to give the patient? What is total patient care? And following this, what does the nurse do about the delivery of this care?

Sooner or later hospital care will have to be related to the community services because obviously the sort of care that is given in the hospital has its counterpart in the community itself. Early discharge exacerbates the load on the community health staff. If patients are not discharged very early, you obviously give a different pattern of care within the hospital, perhaps relieving the community of a lot of its present problems. The point worth emphasising is that these are interdependent and not independent services.

Just before I finish, may I draw your attention to one or two specific things we have been doing in this field? On the training of staff we have found some conflict between training and service. What the Training Council requires—The General Nursing Council in England—sometimes is at variance with the actual hospital needs as far as services are concerned.

If the training model is unbalanced (for example, the time spent by students in a specialty is too long), it has repercussions in the staff complement. You can, in fact, have increased staff complements just because training is scheduled inefficiently. On quantity of nursing care, the nursing dependency based on the work Dr. Flagle has done in Johns Hopkins is very useful for measuring the quantity of nursing care actually given to the patient. Most of us recognize there are limitations to the actual method, but in fact it has some very useful practical elements attached to it.

On the quality of care, I think most people agree this is a very difficult area to work in. As a preliminary we have looked at what the staff think about the care given. We have asked professional nursing staff of all grades along with doctors and paramedical staff to classify wards into good or poor care, into strict and slack discipline, and into happy and unhappy wards. This has been very useful because there is a fair degree of conformity of thought among the staff about wards in general. Dr. Revans probably has a lot of information on this as well.

We also extended that to ask patients what they think about the hospital service provided, and again there is a high degree of correlation between what the patients think and what the staff think. Perhaps we haven't made enough of the consumer reaction in hospital affairs. We should be more attuned to what the patient thinks about the service.

Then, on the black box of total patient care, which is probably the most difficult area for all, we have recently been looking at the possibility of using videotape records of the actual service provided in the ward. This is a very promising technique. It enables us to capture data and to use and assess it over and over again. The trouble, of course, is in reducing this data to some sort of manageable indices, but again I don't think that this in itself should deter us. If we did capture this kind of data and showed it to the relative professional staff, we might through experiment and discussion arrive at a stage where we could say what total patient care is all about.

Dr. Jelinek

I am probably the wrong person to critique Dr. Flagle. As you all know, Dr. Flagle is considered the "father" of operations research applications in the health care field and in a way is like God. To critique him would be the same as to ask you to critique God and, therefore, I have to agree with everything Dr. Flagle said.

However, I'd like to make a few points, most of which directly support some of the statements Dr. Flagle made. I have been for 6 years in the academic environment involved in health care research. For the last 3 years I have been associated with an organization attempting to implement some of the research ideas. I would like to use experiences stemming from both the academic and the operational settings to comment on Dr. Flagle's paper.

The problem, in my opinion, in the area of nurse staffing is that we do not have any objective means of relating staffing to the level of service. This can best be illustrated by suggesting that in most hospitals it is not possible to observe any significant impact on the level of service or quality of care resulting from a change in staff size. Most certainly such impact is difficult if not impossible to quantify. Patient care will not go up a great deal if you double the staff, nor will it decrease significantly if you reduce the staff by 50 percent.

Of course, this is a tremendous problem. How do you staff if you cannot evaluate a situation such as I have described? This, in fact, is what Dr. Flagle pointed out through some of his illustrations. As his presentation has shown, on a particular patient unit the staff may be twice as high on a per patient day basis one week as it is another week. The impact of this variance on patient care is not understood, nor is it measured. We also see tremendous differences in staff size and in cost of running a patient unit from one geographic area of the country to another. It is not clear that quality of care is related to these regional staffing and cost differences. Of course, the main problem is that we do not have any clearcut measures of quality. Such measures will have to be derived before the staffing problems can be resolved.

For purposes of discussion I would like to raise the following question. If in fact there exist such large differences in staff on a per patient day basis between institutions without comparable differences in quality of patient care, why not immediately cut staff size in those hospitals that show relative overstaffing? Other than major reduction in cost, what would be the impact of such action? I am just asking the question, not making a recommendation.

I would like to make some general comments regarding another dimension of this area of research. A great deal of effort has been devoted to this subject and many conceptual ideas have been advocated, including patient classification schemes, variable staffing procedures, selective admissions procedures, and reporting systems. However, very few of these ideas have been implemented in a broad scope. For example, we see many hospitals having variable staffing, but when we look closely at their system it imposes little control over matching staff size to workload. The implementation therefore is often found more in works than in actually achieving the established objectives.

To conclude, I would like to make a number of observations and raise a number of questions related to this area of research.

First, the problem that faces all of us is the need to establish objectives for the nursing profession as a whole. What is nursing? For us as engineers working with nursing it is hard to do anything until we understand what it is that nursing is trying to achieve.

Second, there exists a problem of explicitly defining certain terms used by nurses in identifying themselves. For example, what is clinical nursing? We keep hearing the difference between task oriented nursing and clinical nursing. We have difficulty getting a precise definition of what is meant by clinical nursing, clinical nurse specialists, clinical leadership, etc. Many terms have been used to define the nurse and her role.

What is the psychosocial element of care? Any engineering study that comes out in terms of objective measures is generally criticized in terms of lacking an understanding of the psychosocial aspect of care. What exactly is it? We know it in words. We have difficulty quantifying it.

What is meant by continuity of care? We know there are advocates of continuity of care. One way this is expressed is to propose that the same nurse provide continuous care to the same patient. But we also know this is impossible to achieve totally, because the nurse has to sleep and take her days off. What then is continuity of care?

Next is the question of relating research to operations. Are there enough ties? We see nurses doing research in the academic environment. Are they doing this research for the sake of publishing and being recognized among their peers or are they doing it to improve operations? I believe research can be done for the purpose of being recognized in the academic community, but the question I'm posing is, Do we have enough of a tie between research and operations?

Even more important is the tie between education, and research and operation. I think this is an area where the Division of Nursing is playing an important role in trying to establish a better tie, but a significant amount of additional work is needed.

I have a general comment regarding the alternative forms of organizing patient care operations. As Dr. Aydelotte pointed out, we now see many organizational systems in operation. For example, there are many variations of unit management systems. We have many variations of the use of clinical nurse specialists. All of these systems are feasible in that they get the job done, yet we are not able to establish what the effect of each of these systems is on quality of care and cost.

My observations boil down to stressing the tremendous need for establishing objectives for nursing and for devising methods for measuring level and quality of care. I believe that if this conference could somehow focus or direct us as to how we should handle these problems we could make a contribution to the field.

Measurement of Patients' Requirements for Nursing Services

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We dance round in a ring and suppose
But the secret sits in the middle and knows.
Robert Frost

I am pleased to share with you the results of three research studies conducted in Canada as well as many of my own views on the subject of patients' requirements for nursing care.

Although none of the research investigations set out principally to measure patients' requirements for nursing services, they did come face to face with this problem at an early stage. They focused on the identification of patients' nursing care needs, and where attempts were made to quantify these needs, the researchers had to conduct their investigations within the realm of actual care given. We are still faced with the problem of evaluating whether in fact the care given is that which is required.

The first study developed an index of care, a documentation of the types of nursing activities carried out in Department of Veterans' Affairs (DVA) Hospitals. The second investigated the reliability and validity of a completely subjective classification tool for determining patients' requirements for nursing care.

The third study, somewhat more comprehensive than the others, began with the development of an objective classification tool that was subsequently quantified to produce an index of workload. In addition, this study developed and tested a new concept of ward organization, the Unit Assignment System. All of the studies were supported in whole or in part by Canadian National Health Research Grants.

The underlying theme has been predominant in the vast majority of related studies of matching nursing resources to the nursing care requirements of inhospital patients. The keynote was effective utilization.

Finally, some comments regarding guidelines for future research are presented. A descriptive model for the study of nursing as an interdependent variable in the health care system is discussed.

An Index of Care

The first investigation (*1*) was carried out at DVA Deer Lodge Hospital, Winnipeg, Manitoba, in 1965. It arose out of an interest in modifying morbidity and mortality data to show the type of patients being cared for in DVA hospitals across Canada. Prior to the study the statistical data collected under the Veterans Treatment Regulations provided little information to indicate the type of care the patients were receiving in the hospitals. A classification of patients according to the type of care provided to them was required.

A questionnaire was devised utilizing a selection of procedures that appeared to best indicate nursing efforts. This questionnaire became known as the Level of Care Assessment Return, a checkoff sheet of some 55 items to describe a patient. The 55 items were grouped under the following headings: Clinical Monitoring, Technical Nursing, Nontechnical (basic) Nursing, Physical Medicine, and Organized Psychiatric Unit.

At the time that the Level of Care Assessment Return was being completed on every patient in the hospital, the patients were all classified according to seven predefined care categories ranging from intensive to residential.

Analysis of the results of the survey showed that although the amount of direct nursing care ranged from a large amount to a small amount, only three levels of care could be identified: Level I—minimal amount of direct nursing care, Level II—moderate amount of direct care, Level III—maximum amount of direct nursing care. In fact, the residential, investigative, and convalescent care categories were grouped into Level I (minimal care), the extended treatment and intermediate care categories grouped into Level II (moderate care), and the acute and intensive care categories into Level III (maximum care). Analysis of the completed Level of Care Assessment Returns matched with each level revealed the procedures of direct patient care that characterized each care category.

A numerical value was assigned to each of the 55 items of the Level of Care Assessment Return, bearing in mind the amount of effort involved in the particular procedure. This step made it possible to produce a classification of patients according to the levels of care by data processing methods.

Thus a method of classification of patients according to the type of care provided to them had been developed. It required only that the charge nurse complete a Level of Care Assessment Return for all patients. Following data processing, total patient census was divided into three levels of care.

Further validation was established in a number of hospitals through the timing of the procedures listed in the Level of Care Assessment Return (*2*). Both the direct and indirect care times associated with each procedure were obtained for each patient level. Through continuous observation for 24 hours the total amount of direct nursing care received by each observed patient was determined. The timing studies demonstrated that the Level of Care Classification of a patient, correlated with the amount of care he received and measured in time, is a valid method of categorizing the severity of the case.

The research resulted in a method of classifying patients, independent of observer judgment, into levels of care and a system for estimating the nursing workload associated with each level. In addition, the analysis contributed a great deal to our knowledge about the variables influencing staffing.

There has been, however, a limited amount of application to non-DVA hospitals. I would propose three major reasons for this. First, the classification system is based totally on the physiological needs and care of the patient. Instructional and emotional needs, independent of the nursing procedures studied, do not appear to have been considered. According to Dr. MacDonell, the assessment provided little evidence of emotional or psychosocial needs being met apart from that accompanying regular treatments. Second, the nursing activities and procedures identified and their determined times may be peculiar to the types of hospitals studied. Third, the patient mix in terms of kinds of care necessary, coupled with the treatment modalities, may not be similar in other institutions.

Regardless of the limitations, real or perceived, the system does provide a more accurate account of patient care than the usual census or diagnostic category estimate. For the DVA hospitals across Canada precise information regarding type of care provided to patients at any given time is available and allows a more realistic judgment to be exercised concerning immediate needs of the hospitals. Trends in the types of patients for whom care is provided may be identified on the basis of accumulated returns, making it possible for predictions and projections concerning future requirements for facilities and personnel. Finally, the information can be utilized for staffing patterns indicating types and numbers of nursing staff within the hospitals studied.

A Subjective Classification Analysis

The second investigation (*3*) was conducted at the Vancouver General Hospital, Vancouver, British Columbia, during 1970. The study was initiated in the interest of testing the reliability and validity of a completely subjective patient classification tool. A comprehensive review of classification methodologies had led to the conclusion that existing tools paid little attention to the patients' requirements for emotional support and instructional needs and were too restrictive in terms of the predetermined criteria selected. In addition it was felt that the more common three and four category classification systems were not sensitive enough to the diverse needs of patients in acute care hospitals.

A critical indicator, independent of observer judgment, to encompass the diverse psychosocial needs of patients was not apparent. Therefore the notion of an objective checklist was discarded in favor of a completely subjective tool. A classification tool was developed with five categories ranging from minimal to intensive care. It was this completely subjective tool that was selected for the rigid reliability and validity testing.

Five acute care hospitals provided the study setting, using one adult medical and/or surgical nursing unit of approximately 35 beds from each. All patients in the selected units were classified on five different occasions independently by four categories of nurses. The head nurse classified all patients. Registered nurses on the unit classified those patients assigned to them. One nurse from another nursing unit of the same hospital classified all the patients as did a nurse from one other hospital.

This procedure allowed researchers to test two major hypotheses of reliability. The first was to test for differences in the way various categories of personnel in a hospital classify patients; i.e., head nurse, float nurse, ward nurse. The second was to test for differences in the way various nursing personnel from different hospitals classify patients.

It was found that there were significant differences in the way different categories of nursing personnel classified patients, both within a hospital and between hospitals. Thus, using discrete analysis, the subjective classification tool as used by the nurses could not be considered a reliable method of determining patients' needs.

There was a tendency, however, for the nurses to become more discrete in their assessment of patients' needs as their familiarity with the classification tool increased. An alternative form of analysis was presented that allowed one degree of scale difference between nurse classifiers. Using the alternative analysis the tool was found to be reliable.

While the nursing personnel were classifying the patients using the designed tool, a nurse researcher obtained additional information on each patient. This information was comparable to the objective classification tool developed at Johns Hopkins Hospital and to the procedures documented in the CASH studies on staff utilization (*4,5*). The validity of the five category subjective classification tool was tested and confirmed against the Johns Hopkins system. The patient characteristics data fashioned after the CASH studies were collected primarily for their possible contribution to a measurement of workload related to the five categories. These data, however, were not analyzed at the conclusion of the report.

The study contributed a great deal to solving the problems encountered in establishing reliability in classification tools. In addition it identified some of the problems to be reckoned with if we are to use classification tools to provide comparative information on more than one hospital. Even in the face of the reliability restrictions the tool can represent a gross indicator of the nursing care needs of the patients—an indicator that is five times more informative than the presently used criteria of census.

A 5-Year Study of Nursing Problems

I would like now to report on a third study just recently completed after 5 years of investigation. The study was conducted by the Hospital Systems Study Group at the University of Saskatchewan in Saskatoon, Canada, with most of the data collected in the University Hospital in Saskatoon. Five major reports dealing with different phases or aspects of the study were published during the period of investigation.

Phase I began in 1966 with the objective of finding an operational solution to the problems of reorienting hospital organizational structure into direct contact with the patient and his needs (*6*). It is not surprising that the first step was to identify the needs of the patients.

A four category classification system was designed to objectively categorize patients according to their needs for nursing care (see figure 1). Four components of care were isolated as the critical indicators of the patients' overall requirements of nursing care. These components—personal care, feeding, observation, and ambulation—were further broken down into individual determiners that represented a patient's degree of dependence upon nursing. Two additional determiners were found to be necessary: one concerning incontinence and other regarding surgery.

The classification tool is in the form of a check-off list comprised of the 13 determiners, each designated according to the amount of nursing involvement they represent: A—minimal, B—average, C—intense.

Although the tool has the appearance of an objective classification method, there is in fact some subjectivity involved. This is more clearly evident in the guidelines developed to assist the nurses in selecting the correct determiners of care. The guidelines, presented in appendix II, set down the parameters for all of the critical indicators. Of particular importance is the observation component. This component provides for the inclusion of emotional and instructional needs of the patients.

Identification of the characteristic needs of each category of patient in terms of the amount of nursing care time they receive, the type of staff who care for them, and the type of functions performed was the second step. This was achieved by conducting direct care (inroom) activity studies on both general medical and surgical nursing units.

The results of the study documented a wide variety of problems:

- There was wide variation in nursing care time spent with patients of different categories.
- There were extreme fluctuations in workload when one or more intense care patients were removed or added to the ward population.
- There was significant difference in allocation of functions among different levels of staff depending on the care category of patients served.
- There was variation in magnitude and in character of the workload to which staff must adjust.
- There was lack of clear role definitions for the various levels of nursing personnel on the ward.
- Staff appeared to enter the room to perform a single function and then leave.
- Numerous people participated in the patients' daily bedside care, often for only short periods of time. Intercommunication and supervision and checking of subordinates appeared to involve a considerable amount of time, effort and confusion.
- Continuity of assignment was difficult or impossible, resulting in limited opportunity for nurses to know their patients as individuals and thus to provide personalized patient care.
- Considerable amount of time was spent by nurses "in flight" between the center of communication (central nursing station), supply area (service room), and patient's bedside.
- The unpredictable nature of the workload made it impossible to staff in a manner that would ensure a consistent level of nursing care matched to patient's need. Periods of signif-

Figure 1.—Patient classification tool.

WARD	PERSONAL CARE			FEEDING		OBSERVATION			AMBULATION											
DATE	(C)	(B)	(A)	(C)	(B)	(C)	(B)	(A)	(C)	(B)	(A)	(C)	(C)							
PATIENTS	Complete bath	Bath with assistance	Basin or tub	Fed or NPO	Partial help	Constant - q1h	q2 - 4h	q4h or less	In bed or chair position & support	Up with assistance or bed rest BRP	Up and about	Incontinent	Pre-op		A Minimal	B Average	C Above aver.& intense		Category	Comments
Brown, Mr. A.			X					X			X				3	0	0		1	Minimal care
Walker, Mrs. W.		X			X		X			X					0	4	0		2	Average care
Smith, Mr. G.	X			X		X				X					0	1	3		3	Above average care
White, Miss G.	X			X		X			X			X			0	0	5		4	Intensive care

icant overstaffing and gross understaffing resulted.

These problems concurred with those expounded by the nursing staff during a period characterized by high turnover rates and low morale. During the course of the research, every effort was made to find operational solutions to these problems. Since many of the problems were more clearly expressed as a result of the categorization of patients, the next step was to validate the classification tool.

Validation was carried out by comparing the results of the classification tool with the head nurse's subjective opinion and with the Deer Lodge Level of Care Assessment Return (7). The head nurse was instructed to evaluate the patient's need for care on the basis of her knowledge and experience and to assign each patient to one of four levels of care ranging from minimal to intense. A project nurse classified the same patients using the Phase I tool and the Deer Lodge Level of Care Assessment Return.

There was no significant difference among the three systems when the chi-squares test of goodness of fit was applied to the data. At the same time, the Phase I tool was found to be easier and less time consuming to use than the Level of Care Assessment Return. A general description of the four categories is presented in appendix I.

Workload Index

As a result of the extensive activity studies conducted, the relationship among the four categories of care, in terms of the average amount of direct nursing care patients received, was identified. It was seen that on the day shift average patients received twice as much, above average care patients six times as much, and intense care patients 12 times as much direct nursing care as minimal care patients. The ratio among the categories on the day shift became identified as 1:2:6:12. Subsequently, the ratio of the average direct nursing care times on evening shift was found to be 1:2:7:14, and on the night shift, 1:2:7:25.

Further analysis revealed that, on the average, patients received four times more direct nursing care on the day shift than on the night shift and twice as much care on the evening shift as on the night shift. Thus the ratio of the amount of nursing care received on day, evening, and night shifts was 4:2:1.

By multiplication of the day shift figures by four and the evening shift figures by two, the resultant numbers become the actual index and reflect not only the relationship among categories on a shift but the relationship among shifts for each category as well. Table 1 shows these relationships.

These ratios may in turn be used as weighting factors for the corresponding categories on each shift to arrive at an *index of patient load* on the nursing unit for any shift.

The procedure is very simple. If, for example, the ward census is composed of 10 minimal, 20 average, 2 above average, and 1 intense care patients the workload index for the day shift is determined by multiplying the weighting factor for each category for the day shift by the number of patients in each category and summing the products. That is, (10 × 4) + (20 × 8) + (2 × 24) + (1 × 48) = 296. The same procedure would be used for the evening and night shifts and, assuming the same patient mix, yield workload indices of 156 and 89 respectively.

The impact of the workload index when calculated over a period of time on a nursing unit can be very informative and the relationship between census and workload most revealing. Table 2 shows the patient load index for all three shifts during 1 month on one surgical nursing unit. It can be seen that the census ranged from a low of 28 patients on the 21st day to a high of 38 patients on the 28th day. However, the day load index on the 21st day was quite high at 492, but on the 28th, with 10 more patients, the index was much lower at 396. Similarly, on the 5th and the 12th of the month the census was equal at 35 patients, but the day load index was 512 and 272 respectively for the 2 days.

Table 1.—Ratios of direct nursing care time received per shift and patient category

Shift	Category			
	Minimal	Average	Above average	Intense
Days	4	8	24	48
Evenings	2	4	14	28
Nights	1	2	7	25

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Table 2.–Daily patient load index

	Patients per category					Load index		
Date	Minimal	Average	Above average	Intense	Census	Day	Evening	Night
1	4	19	7	1	31	384	210	116
2	4	16	7	1	28	360	198	110
3	8	17	5	3	33	432	238	152
4	7	19	3	4	33	444	244	166
5	8	15	9	3	35	512	286	206
6	6	17	10	–	33	400	220	110
7	6	18	8	2	34	456	252	148
8	6	21	5	–	32	312	166	83
9	5	23	3	1	32	324	172	97
10	9	20	–	1	30	244	126	74
11	10	20	2	1	33	296	156	89
12	12	22	–	1	35	272	140	81
13	14	16	3	3	36	400	218	142
14	10	23	–	1	34	272	140	81
15	9	16	3	4	32	428	236	162
16	12	15	2	2	31	312	168	106
17	10	20	1	1	32	272	142	82
18	7	18	6	2	33	412	226	135
19	7	15	7	3	32	460	256	161
20	6	16	4	4	30	440	244	166
21	7	13	1	7	28	492	276	215
22	4	18	4	5	31	496	276	193
23	2	21	6	4	33	512	284	186
24	4	19	8	3	34	504	280	173
25	2	21	10	1	34	464	256	139
26	6	21	6	3	36	480	264	165
27	5	21	7	2	35	452	248	146
28	9	24	3	2	38	396	212	128
29	3	27	3	3	36	444	240	153
30	6	24	2	3	35	408	220	143
31								

Table 3.–Conversion of index to staff required

Derivation of conversion method		Example
Minutes of direct nursing care required on the ward	INDEX × M	200 × 5 + 1,000 min.
Hours of direct nursing care required on the ward	$\frac{\text{INDEX} \times \text{M}}{60}$	$\frac{200 \times 5}{60} = 16.67$ hrs.
Hours of direct nursing care provided per nurse* per 8 hour shift	P × 8 hrs.	.42 × 8 = 3.36 hrs./nurse*
Total nursing staff needed to meet all care requirements for the 8 hour shift	$\frac{\frac{\text{INDEX} \times \text{M}}{60}}{\text{P} \times 8}$	$\frac{16.67 \text{ hrs. req'd.}}{3.36 \text{ hrs./nurse}} = \frac{5}{\text{nurses}}$
Simplified expression	$\frac{\text{INDEX} \times \text{M}}{\text{P} \times 480}$	$\frac{200 \times 5}{.42 \times 480} = \frac{200}{40} = 5$ nurses

*"Nurse" represents any nursing staff member, including registered nurses, certified nursing assistants, and orderlies, whose primary role is to provide direct patient care.

M–is the average number of minutes of direct nursing care received by a *minimal* care patient on night shift (e.g., M = 5 minutes).

P–is the percentage of nursing staff time spent on direct nursing care per shift (e.g., P = 42% = .42).

Index–is the workload index for one shift (e.g., Index = 200).

Figure 2 represents a graph by day of the month of the patient load indices given in table 1. The range on the day shift extends from a high load index of 512 to a low of 244. The daily fluctuation in workload is evident through the month and particularly so when one notes the decrease in workload from the 7th to the 8th and the sudden increase from the 14th to the 15th.

The fact that census may be most misleading when used as the sole basis for judging workload is obvious. The problems related to providing a consistently high standard of patient care in the face of dramatic daily fluctuations in patients' nursing care needs are also obvious.

When several months of graphed information are compared (see figure 2), trends in the patient care load over a period of time become evident. They provide an objective basis on which to compare patient load from day to day or month to month on any given nursing unit or to compare between nursing units and to substantiate, where census cannot, real changes in workload.

Workload Index as a Staffing Guide

Relating the workload index to the required number of nursing staff was the next step in the project and necessitated that the number of hours of nursing care that the index represented be known (*8*). This information was in fact easily identified as a result of the activity studies. It was observed that, on the average, the minimal care patients on nights received 5 minutes of care.[1] Since the ratios of categories to each other and between shifts are all expressed as multiples of the amount of care a minimal care patient receives on the night shift, the number of hours of direct nursing care required could be obtained by multiplying the calculated load index for any shift by 5/60. The activity studies also show that on the average the nursing staff spent 42 percent of their 8 hour day (3.36 hours) giving direct care to patients.

By dividing the number of hours of direct care required by the amount of direct care provided by one nursing staff member, an estimate of the represent the upper and lower limits for each shift that may reasonably be expected by the budgeted number of nursing staff required to provide the total direct and indirect care requirements of the nursing unit was obtained. Table 3 represents the derivation of the conversion method of workload index to required nursing staff.

Figure 3 graphs the daily workload index per shift over a 1-month period. The required number of nursing staff as determined by the conversion method is also shown. Thus, for a specified workload index, the number of staff required may be estimated. The broad horizontal bars in this graph number of nursing positions. Thus, as indicated on the day shift, the level of activity for the 10 budgeted positions should not be expected to extend beyond the range of that which 9½ to 10½ people could manage. It should be noted that the head nurse and assistant head nurse are not considered part of the budgeted nursing staff, as only those staff members whose primary role is to provide direct nursing care are included.

The utility of such graphs extends far beyond the realm of academia. Indices that peak far above the bounds or baseline provide documented evidence that additional nursing staff are temporarily needed. When the indices of more than one nursing unit are peaked above the baseline, the graphs become useful in aiding administration to set priorities in the allocation of the nursing staff available. Indices that dip below the baseline may indicate that staff members should be transferred temporarily to another nursing unit.

Finally, the need for permanent reallocation of nursing staff becomes evident in the face of consistently high peaks above or dips below the baseline. The daily calculation of the workload index coupled with a flexible staffing policy reduces to a large extent the great variability in workload to which a given number of nursing staff must adjust. Closely matching the staffing on each shift to the nursing care needs of patients can do much to promote a consistently high standard of patient care.

The Unit Assignment System

The development of a simple objective tool for classifying patients according to their requirements for nursing care afforded the opportunity to investigate more clearly the different nursing activities required for each patient category. This investigation resulted in a new concept of ward

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[1] Further studies revealed that 3 minutes of care was more likely to be the average for minimal care patients on nights.

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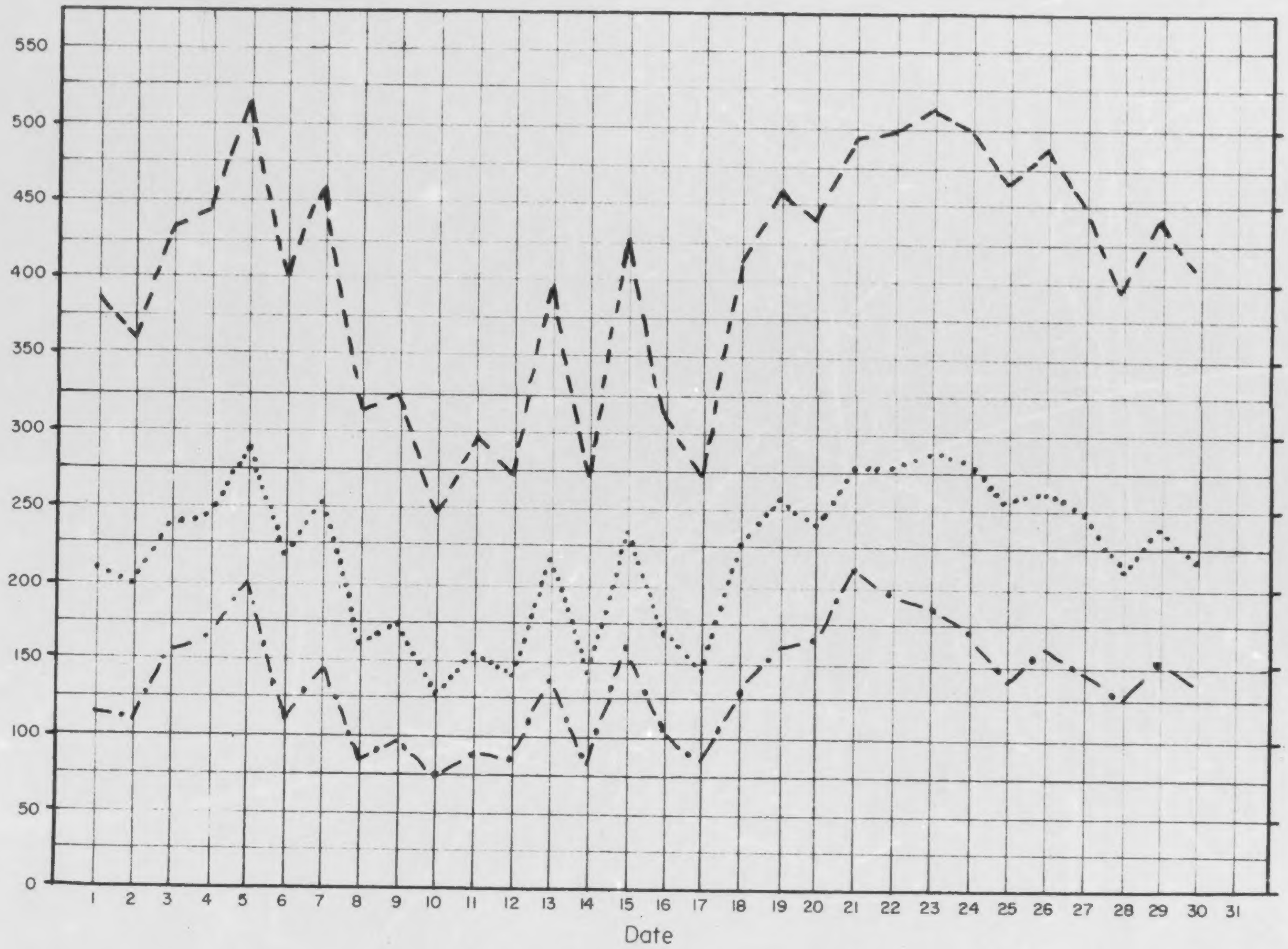
Figure 2.—Graph of patient load index.



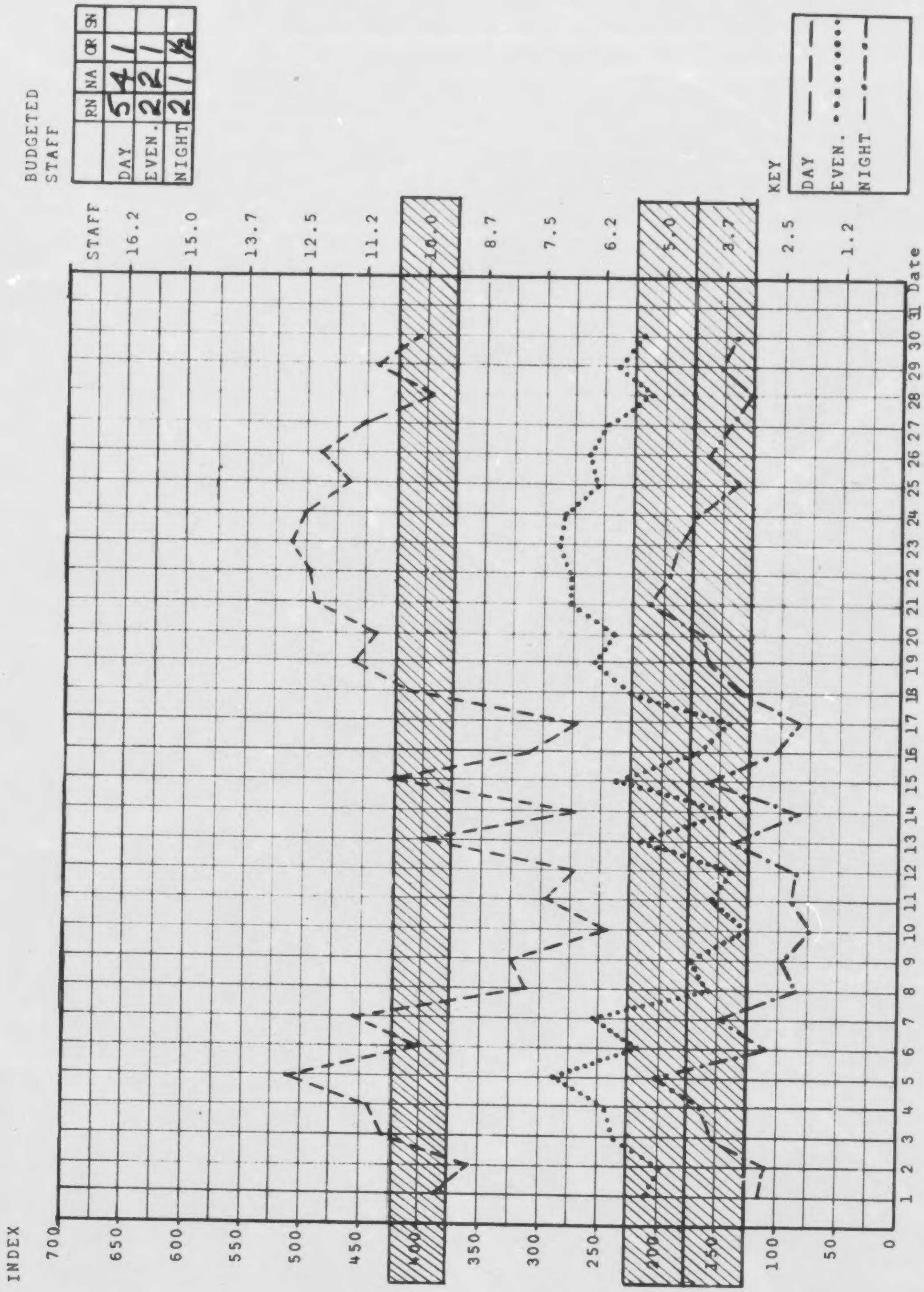


Figure 3.—Graph of daily workload index.

organization—an organization that would focus the attention of the health care team on the patients' needs and care. The activity studies had revealed that the central nursing station, under a modified team nursing method of assignment, was the principal focal point on the ward. In addition, many of the activities of the nursing staff related more to the organization of the ward and the method of assignment used than to the needs of the patients. In summary, the patient was not the principal focus; the attentions of the health care team were not centered around his needs or his care.

The system entails decentralization of the ward structure by dividing it into units of care classified as intense, above average, average, and minimal care units. A unit is defined as that number of patients that can be effectively cared for by a registered nurse given adequate nursing assistance and supply services. A standardized portable supply and communication station is centered in each unit and is stocked with patients' charts, drugs, trays, and a phone intercommunication system. Each unit is situated close to a group of patients, making it possible for the nurse's attention to remain on the patients.

Guidelines for Future Research

Our personal endeavors have frequently centered around a vision of a system of patient classification accompanied by some form of workload index applicable to the vast majority of general or acute care hospitals. We have been influenced by their potential impact not only on the internal operations of a hospital but also on the entire health care system. We have envisioned a classification system based on patients' needs accompanied by an index of the workload required to meet those needs that would be applicable to all hospitals.

It would appear that at the present time the developed tools fall short of our aspirations. As internal tools, particularly within the institutions where the basic research was conducted, they have a great deal to offer in terms of understanding the patient care process. Our experience has been, as previously mentioned, that patient classification systems alone provide a much more reliable account of the nursing care needs of patients than the usual patient census or diagnostic category estimate.

It is my impression, however, that in terms of our present data base, their application as tools by which comparisons between hospitals may be made is limited. Differences in treatment modalities, physical structure and design, educational commitments, and policies of our hospitals are just a few of the reasons why difficulties are encountered.

I would suggest that there are at least three reasons why our tools have not been able to accomplish much beyond their present value of internal information sources. First, classification tools that include the psychosocial needs of the patients frequently do so at the expense of forcing subjective opinions to enter into the assessments. This compounds the problems of reliability among those using the tools. Even when tools are designed to be completely objective assessments, rater reliability should not be considered inherent. Second, the problems of validating the tools have not been satisfactorily reconciled, and the attempts that have been made are not necessarily transferable to other institutions. Finally, workload indices have primarily been developed through investigations of present operating systems and again are not necessarily transferable.

Study Model

As we approach a path for further research, I believe our greatest commitment should be to approach it within the realm of the health care system. This single fact alone should urge us to identify a model to permit a total systems approach. Figure 4 is one such model. It identifies nursing as an interdependent variable in the health care system.

The components are easily identified in terms of the system being studied. *Patients* may be viewed in terms of care given, attitudes, expectations, or post hospital experience, etc. *Staff* may be viewed in terms of volume, competence or

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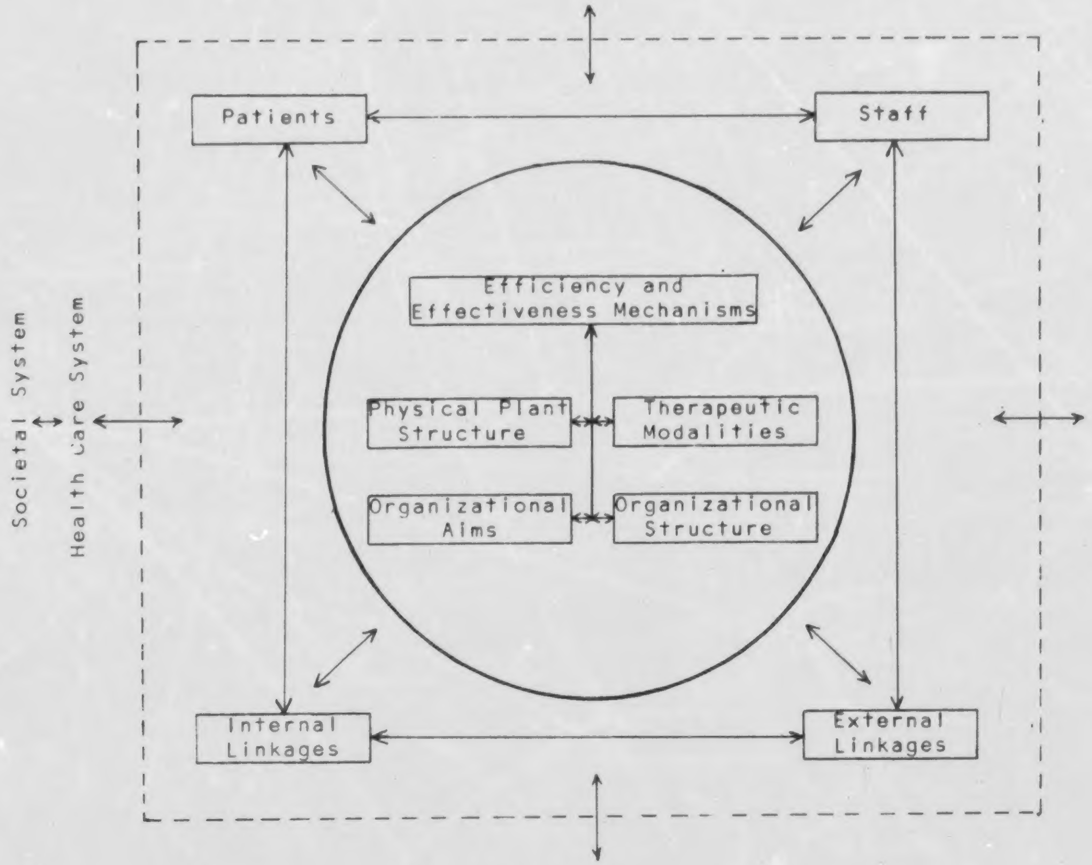
Figure 4.—Nursing: an interdependent variable in the health care system.



Adapted by Shirley M. Stinson, Professor, School of Nursing and Division of Health Services Administration, University of Alberta, Edmonton, Alberta, September 1972. Revised April 1972 (mimeographed) from a Paradigm, "System Properties of Educational Units," designed by SLOAN R. WAYLAND, Professor of Sociology and Education, Teachers College, Columbia University, New York 1966.

attitudes, etc. *Internal linkages* may refer to a specific department or nursing station and *external linkages* may refer to a coordinated home care program, a communication system, or a visiting student. In the same way, all components may be described and expanded to relate to the area of scale.

This approach, although not new to health care evaluation, provides us with at least three distinct advantages. First, it prevents us from omitting the patient as a central focus. Second, it provides the framework for the difficult task of defining variables. Third, it assists us not only to recognize but to study the relationship of interdependent variables. Once the system is defined, the framework for alterations becomes visible and the model can act as a manual simulation tool.

We are still faced with very serious economic problems. Undoubtedly, much of our future research will be directed toward achieving an operational solution to the effective matching of health care resources to health care needs. We must not, however, neglect to conduct our research with equal attention to economics: the effective matching of research resources to research needs.

I propose that if we conduct our studies within the realm of a model such as presented, we will have conducted it in an efficient manner and its application will have the potential for implementation in a wider variety of settings.

Appendix I

Definition of Categories

MINIMAL CARE

Patient is physically capable of caring for himself but requires minimal support plus treatments or monitoring (B.P., T.P.R., observation, etc.) by the nurse q4h or less.

AVERAGE CARE

Patient requires an average amount of nursing care and medical support, e.g.,

- past the acute stage of his disease or surgery,
- 3–4 days post-op cholecystectomy,
- diabetic for reassessment,
- conditions requiring extensive investigative procedures.

ABOVE AVERAGE CARE

Patient requires a greater than average amount of nursing care, medical support, and use of special equipment, e.g.,

- after acute phase of CVA (residual paralysis),
- advanced Parkinson's syndrome,
- radical mastectomy of cholecystectomy,
- 2nd day post-op,
- a debilitated, dependent elderly person.

INTENSE CARE

Patient requires very frequent to continuous intensive nursing care and close supervision by medical personnel with support from technical equipment, e.g.,

- multiple sclerosis on a rocking bed,
- severe burns,
- 1st day retropubic with continuous irration,
- comatose patient,
- severe toxemia of pregnancy.

Appendix II

Guidelines to Assist in Selecting the Correct Determiners in the Classification System

PERSONAL CARE

Complete Bath

Patient is dependent upon the nurse for his complete bath. It could be that the bed bath is given by the nurse or that the patient requires continual coaching by the nurse during the bath, as in rehabilitation. It could also be a tub bath or sling bath if the patient requires continuing assistance or if more than one person is needed for assistance: e.g., burn bath. One must consider age, general condition, tubes, appliances, etc., which inhibit the patient's ability to be independent.

Basin or Tub with Assistance

Patient requires assistance with washing back and legs. Patient needs bath equipment set up, partial assistance and periodic supervision and coaching. Patient may only require preparation of the bathtub and assistance in and out of the bathtub.

Basin or Tub

Patient takes bath independently; back may be washed by nurse.

NUTRITION

Fed or N.P.O.

Fed—total meal fed by nurse and continuous supervision during the meal.

N.P.O.—implies tube feedings, gastrostomy feeding, etc. Exclude diagnostic procedures.

Partial Help

Meal tray set up by nurse, followed by partial assistance but not continuous supervision or frequent encouragement and teaching.

OBSERVATION

Note: One must recognize the difference between intensive medical therapy and the patient's need for intense care when interpreting this component. This component should be interpreted very broadly.

It implies observation of the patient's state of well being and psychological support to patients, relatives, and friends. Include the patient's need for explanation and teaching; e.g., new mothers, colostomy, diabetic. Consider procedural activities in which nursing observation is the basic component; e.g., vital signs, dressings, I.V. infusions, deep breathing and coughing, medications, compresses, intake and output, care of drainage tubes.

Consider diagnostic tests; e.g., gastric analysis, lumbar puncture, Hollander test, 24-hour urine collection.

It could include a confused patient who is up in chair or up walking and requires surveillance at regular intervals. The frequency of the observation will guide you in selecting the appropriate determiner:

CONSTANT to Q1H—Above Average or Intense.
Q2H to Q4H—Average
Q4H or less—Minimal

ACTIVITY

In Bed or Chair with Position and Support

Bed patient who requires exercise, positioning, and support with pillows or sandbags at least Q2H; e.g., a helpless patient following C.V.A. or an immediately post-operative patient. Consider as well the patient who requires the above while in bed but is also lifted out of bed and positioned in a chair BID or more frequently; e.g., quadriplegic, chronically debilitated dependent patient.

Bed Rest with B.R.P. or up with Assistance.

Patient who requires bed rest but changes his own position as necessary in bed. This patient may require assistance in getting out of bed as well as to and from the B.R. Patients may require assistance with activity because of the presence of Levine tubes, I.V.'s, catheters, etc., or because of their general condition.

Up and About

Patient who does not require assistance with ambulation. He is up as tolerated or independent with the wheelchair. He has learned to manage nonrestricting tubes such as catheters, T-tubes, or I.V.'s. A rehabilitated paraplegic could be considered in this group.

Note: The two following determiners are above average or intense care determiners because they include psychological support and teaching as well as the procedural activities involved.

Incontinence

Patient who does not have voluntary control over the excretion of bodily wastes; e.g., feces, urine fistula, or sinus drainage or patients with colostomies, ileostomies or ureterostomies.

Pre-op

This column is checked the *morning of surgery* for all patients going to the Operating Room. Also, it includes any diagnostic procedures requiring extensive workup, preparation of the patient, and frequent observation and followup; e.g., cardiac catheterization, renal arteriogram, pneumogram.

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DISCUSSION OF
MRS. GIOVANNETTI'S PAPER

Discussion Leader

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Dr. Wolfe

I have been trying to figure out a way to organize my comments and I have come to the conclusion that there is no possible way to do it. So I'll just make some general comments and criticisms relative to the staffing situation as discussed.

First, I disagree that this kind of classification methodology is not transferable. I was not at all surprised to find that three categories were finally decided upon I have seen this happen over and over again. The VA, in investigating its four categories, found the last two classifications indiscernible. I think four classifications were found in one situation because many hospitals have intensive care units and we, to some extent, are combining progressive patient care and controlled variable staffing to take care of the four categories that probably do exist rather than the three.

I am not sure why we are still doing studies on classification. It appears that no one wishes to believe anybody else's results without some kind of reevaluation for their own institution. I don't really think hospitals are as different as we claim they are. They have many commonalities and many similarities that can be specified if we take a very close look.

I think this lack of acceptance results from the fact that we nursing people are not willing to accept the validity related to patient classification, nor have we done any studies to really validate the effect of classification on workload. That's what we really have to validate, not whether the classifications are valid and reliable or whatever else you like but whether the whole concept of attaching classification to workload is valid.

We can assume that nurses are humans and have human capacities, and we have all observed that in a nursing unit the ability of the nurses to accommodate to the workload is terrific. They can take shortcuts. They can skip steps. They do what they must to perform the minimum tasks, and if they can do more tasks, fine, but if they can't they at least get the minimum tasks done.

Given the fact that nurses adapt to heavier or lower workloads, what we need to do is to evaluate whether the minutes of care given are a real validation of workload. Real validation requires extensive study of how the number of tasks and the quality, and by "quality" I mean comprehensiveness of tasks performed, for the whole nursing unit varies as these workload indices vary. That is what we have to demonstrate. Patient satisfaction and dissatisfaction are not the only measures, but they are certainly measures we can use to determine whether any change in these factors takes place relative to workload.

My second comment is that the expectation we have of staffing studies is too great. We typically get estimates for times and so forth that are much more precise than we have any need for. We only have the ability to manipulate staff in terms of whole people or sometimes half people—in rare cases, 2 hours' worth of person—and the fact that a workload differs by a couple of points within relatively wide ranges doesn't make any difference at all.

What we'd like to do is to have a classification scheme that is reliable within these limits, and that's why I think that the subjective classification scheme just discussed is perfectly reliable. If it is off by one category, that wouldn't bother me. I would consider the reliability criterion to be whether it would change the number of personnel you need, not whether it correlates with itself. If blue dots on the forehead were enough to discriminate various patients then that's all we'd need to use, nothing more complex than that.

Finally, classification is only a guide and it should be used as such. Nothing more should be gleaned from it than it is capable of giving. One of the things we haven't discussed is the use of the case mix, and this is an important consideration in any staffing study—case mix and staff mix.

It doesn't always make sense to be perfectly efficient, and we only have to be efficient within relatively wide spectrums. We need a proper balance of the specialization and the economics associated with it.

Nursing Staffing Patterns and Hospital Unit Design: An Experimental Analysis

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Introduction

This is a report of part of a larger study (*1*) conducted to evaluate potential differences in patient care in two basic types of hospital nursing unit design; namely, radial and angular shaped units. Very little research has been conducted, particularly controlled experimental studies, on nurse staffing patterns. Especially neglected has been the effect of physical design and spatial geometry of hospital nursing units on patient care (*2*). While several studies have investigated the potential impact on nursing care of a few differently shaped nursing units their relationship to specific nurse staffing patterns has been ignored (*3,4,5*).

Man's use of space has long been a topic of scientific interest, particularly in the social and behavioral sciences (*6,7*). These and more recent studies and conceptualizations have provided a theoretical as well as a conceptual foundation upon which further and more sophisticated research on the potential linkages between human behavior and physical settings can be based, particularly the writings of Hall (*8*), Sommer (*9*), Barker (*10*), and Osmond (*11*). Conceptualizations of *macrospace* deal with the larger physical environment in such terms as "territory," "community," "locality," "natural area," "ecological area," and have traditionally been essential aspects of the subfield of human ecology. Behavioral scientists have also been interested in human utilization of *microspace*, including perceptions of and reactions to such smaller, more immediate physical surroundings of individuals, presenting such useful concepts as Hall's "proxemics," (*12*) Osmond's "sociopetal space" and "sociofugal space," (*11*) and Barker's "undermanned" and "overmanned" behavioral settings (*10*).

Thus a rich and varied literature dealing with many facets of the physical environment, useful for a better understanding of the relation of physical design of the hospital to nursing and patient care, prevails in the social and behavioral sciences. Despite their availability, little use has been made of these theoretical and empirical works in extant studies of hospital design and patient care and particularly with respect to nurse staffing patterns. Indeed, the author's own research on these topics did not benefit from these theoretical conceptualizations until after such studies were under way.

The Research Project

Nurse staffing patterns were a major factor in a large research project on nursing and patient care in circular and angular hospital nursing units, since the types of nursing personnel could affect patient care on a nursing unit of a given shape. The major independent or "causal" variables of the study were the radial and angular shaped nursing units. The dependent or outcome variables were major types of nursing care, level and amount of nursing care, and nurse utilization of the unit. Nurse staffing was a key intervening variable along with occupancy levels and certain characteristics of the patients in the unit. These include primary diagnosis, room accommodation, and socioeconomic and demographic traits.

The overall study was conducted in a voluntary, acute, nonprofit 350-bed general hospital in St. Paul, Minnesota. In the early 1950's this hospital constructed a number of circular or radial nursing units as well as the traditional angular or L-shaped units. It had and still has a progressive patient care program, including intensive care, intermediate care, and self-care or minimal care. The presence of both radial and angular units afforded an opportunity to do a comparative analysis of patient care given on the two types or shapes of units. Both were almost new when the study was performed and were on the same floor of the hospital.

The nursing units for the study comprised 22 beds: two private or single rooms, six semiprivate or 2-bed rooms, and two 4-bed wards. The radial unit had a total area of 5,180 square feet with corridors of 900 square feet with 133 running feet. Its nurses' station in the center of the unit was 18 feet from the farthest patient bed and comprised 8.2 percent of the total area. The angular unit, resembling an L shape with its nurses' station located at the vortex of corridors, totaled 5,910 square feet. It had corridors of 1,258 square feet with 145 running feet. The nurses' station, 70 feet from the farthest bed, totaled 5.3 percent of total area (see figure 1). Both units were of new construction, similar in interior decor, air conditioned, and in close proximity to each other on the third floor of the facility.

Patient care at the three levels of intensive, intermediate, and self-care were studied in the total project. However, only intermediate care will be reported here, since more variations in nurse staffing patterns were observed at this level of care than at other levels. Also it is the more typical level of patient care provided in such hospitals. An effort was deliberately made to keep the kinds of patients reasonably similar in both study units during the course of the project. Admission to both units was restricted to general medical and surgical patients needing intermediate care, who were not employees or relatives of hospital employees, had never been admitted to a radial unit, and were not emergencies.

To control the intake of patient characteristics during the study an unusual admitting procedure was set up in the Admitting Office. A pair of dice was used to select patients on a random basis. This was after all the previously mentioned criteria had been applied. (We then, you might say, had a multitude of patient characteristics, primary diagnosis being one. We were concerned with the age, sex, and social class of the patient, and we tried to hold the number of factors reasonably constant by randomizing between the two units during the study session. So we made a deliberate effort to make as similar as possible the patient populations being given nursing care during the research time.)

Twelve study situations were set up in the radial and angular study units. Occupancy levels were altered from high (90 percent filled or more) to low (50 percent filled or less). Nurse staffing patterns were varied *quantitatively* from high through average to low. They were varied *qualitatively* by varying the ratios of registered nurses (RN), licensed practical nurses (LPN), and nurse aides (NA) to total staff. Our rationale for the original staffing mix was based on consultation with the Nursing Department of the hospital.

Each study situation was conducted for 4 consecutive weeks during a 5-day workweek (Monday through Friday), excluding holidays. Work sam-

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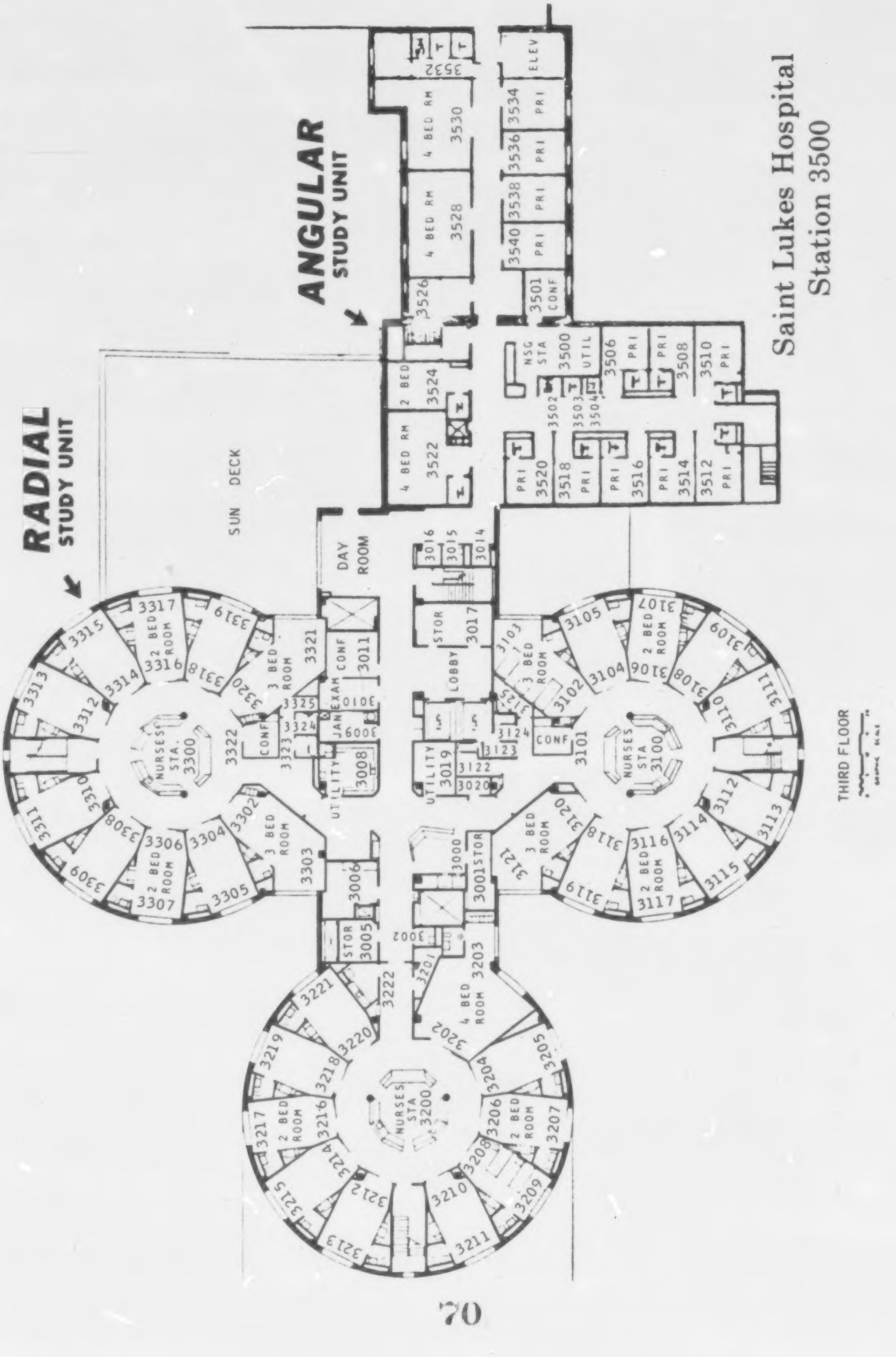

Figure 1.—Radial and angular hospital units.

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pling methods were used to observe the total nursing staff for 24 hours each of these days. At randomly assigned subareas within the units, they were observed at intervals of about 10 to 15 minutes each hour by observors trained in work sampling techniques and in nursing tasks and functions. The average number of observations was about 9,000 for each study situation. The total observations for the 12 situations came to nearly 205,000.

Certain variables were recorded by an additional observor on the unit during the day shift only. A 1 week resettling period was set up before each new study situation to help blur any experimental "halo" effects. An effort was made to use identical nursing personnel in both types of units for all study situations, so that each nurse would be her own experimental control for individual differences among the nursing staff. This was not always achieved, because of staff turnover. No attempt was made to determine what might be the best or most appropriate staffing pattern for these hospital units or patients since such would comprise an entirely separate inquiry in itself. Rather, a major purpose was to determine whether the basic physical design of the nursing unit had *any* effect on nursing care. The effects of different nurse staffing patterns, deliberately varied both quantitatively and qualitatively, were also measured, but other variables such as occupancy levels and divergent patient characteristics were held reasonably constant or randomized.

This project was initiated because the hospital administration wanted an evaluation of their radial units. They were quite new. Controlled experimental studies were, if not limited, not readily available. So the study was set up to evaluate what was going on in these new units.

The nurse staffing patterns were established as follows:

	Shift	RN	LPN	Nurse Aide	Ward Clerk
a. Quantitative					
High nurse staffing (above average)	7 -3	4 (1 Head N.)	2	2	1
	3 -11	2	2	2	–
	11-7	1	1	1	–
Average nurse staffing	7 -3	3 (1 Head N.)	1	1	1
	3 -11	1	1	2	–
	11-7	1	–	1	–
Low nurse staffing (below average)	7 -3	2 (1 Head N.)	1	1	1
	3 -11	1	–	2	–
	11-7	½	½	½	–
b. Qualitative					
High RN staffing	7 -3	5 (1 Head N.)	0	0	1
	3 -11	3	–	–	–
	11-7	2	–	–	–
High LPN staffing	7 -3	1 Head Nurse	5	0	1
	3 -11	1 Head Nurse	3	–	–
	11-7	½	2	–	–
High nurse aide staffing	7 -3	1 Head Nurse	0	5	1
	3 -11	1 Head Nurse	–	3	–
	11-7	½	–	2	–

We felt that to do the job right we had to control a number of factors that everyone in the profession is aware could affect or contaminate the outcome of the study unless they were controlled in some manner experimentally during our study. So an effort was made in this direction. We did not agree to conduct the study in this particular facility until everyone agreed to accept any negative evidence that might be generated by the study. (So many inhouse studies are done to rationalize what the administration already wants to do or has a tendency to be nervous about accepting evidence against.) One of the hospital trustees said, "Well, if we make a mistake in these units, the whole field should know about it so they won't repeat the same mistake."

The same went for the nursing staff. This was difficult because we wanted to set up a number of conditions that the research design required to be sustained over a sufficient period of time to conduct a really valid project from the research standpoint. So a second factor essential to this type of study is a willingness on the part of the staff to conform reasonably well to the dictates of the research design.This is the more difficult problem, particularly when you're experimenting with the number of variables we were trying to do in our study.

We began with what was an approximation of the existing average staffing pattern already going on in the hospital and used that as our baseline to increase it quantitatively or decrease it in just sheer numbers of nursing personnel and then vary it qualitatively between the categories of nursing personnel. When you talk about understaffing and overstaffing you should say *whom* you are understaffing and *whom* you are overstaffing. Is it the registered nurses, the LPN's, the nurse aides, or who? This turned out to be a very important outcome variable, the quantitative variation versus qualitative, the mix of nursing category personnel.

So we proceeded to set up our project in which we would have observers on the units routinely making observations of the activities of the nursing staff for a 5-day workweek, Monday through Friday, and observe them on all three shifts, 24 hours a day, in the unit. We did a good deal of training of the observers. We used LPN's primarily for observers because one thing we found out quickly is that RN's don't like to be observed by other RN's, but they are more tolerant of the lesser trained staff looking at them. Other studies have had the same problem.

After the training session, we checked out the reliability of coding their observations by a number of coders and observers. We obtained very high check/recheck reliability of about 95 percent because the recordings were quite detailed on what the nurse was doing. (When they were answering the telephone we wanted to know whether they were talking to the doctor or a relative of the patient or whom they were talking to, and things of that sort helped make the eventual classification of their activities a little more, in fact exceedingly, reliable.)

We also wanted to sustain a nursing staffing situation for a period of time should the nurses put on a show for the observers (which they can do, you know). If this occurred, we would extend the period of observation after their show was over. This was somewhat of a problem when we got into some of the more difficult staffing pattern situations.

Another thing we wanted to check out was the significance of the activities of the nursing staff on the night shift—if such were equal to, if not more important than, what went on in the day shift in terms of the patients' morale, reactions, and satisfactions for their nursing care. So much research has been oriented toward the day shift when actually other times may be equally significant. Just because that's when the doctor is usually there doesn't mean that other things aren't happening at other times of the day. So we wanted to check out these possibilities.

Then, too, we were quite concerned about the statistical validity of our observations, not only in terms of reliability and validity but also to determine whether we really were getting a good picture of what was going on in these units. So we divided the unit into 10 subareas: the nurses' station, medication area, patients' rooms, the corridor, utility room (they had a tub and shower room to supplement the bathrooms in each of the patients' rooms) and all the different parts of the unit. We randomized these areas in which the observations would be conducted by the observers so that the nursing staff hardly knew when they were being observed. Although the observers may be in the unit, they may not really be recording at that particular place in the unit, and this method enabled us to get a random sample.

We found some feeling of resentment on the part of the aides and the LPN's toward the RN's and the head or charge nurse in the *radial* unit when the latter supervised their activities too closely. If you were to see this unit you could see why. You can be in a patient's room and you can see into all the other patients' rooms, too, so if the head nurse would be attending a patient in one room she could still watch the other personnel on the same unit. She can't do that in the *angular* unit. Such visual contact or visibility of activity on the radial unit did not exist on the angular unit, and this turned out to be a key variable in the whole study that was related to the shape of the unit.

Also, because of differential preferences by the nursing staff for the different units in the hospital, we tried to equalize these preferences by choosing the nursing personnel equally between those who preferred the radial to the angular unit and those who preferred the angular to the radial unit. So we tried to get an equal mix so that any bias that might affect how they attend patients and their activities would be equalized.

Also, we made a very strong effort to use the same nursing personnel all throughout the 2-year project. Instead of trying to get so-called matched groups of nurses, one in one type of unit, another in another type of unit, each nurse was her own experimental control. They would run through the series of study situations in the radial unit, then be transferred into the control angular unit and repeat the staffing pattern and occupancy situations. We only had a certain amount of turnover in the nurses over a 2-year period. About 90 percent of the nursing personnel were the same throughout the project in our studies, which we felt was important.

Because we knew the study would last for a long period of time, we were quite sensitive to the cyclicity of the occupancy level of the hospital. Most hospitals do follow peak and trough periods of occupancy. Summer time in this hospital was its low patient occupancy period and was vacation time for the staff. We were sensitive to the vacation needs of the personnel of the staff so we set up our low staffing patterns and our low occupancy levels when the hospital would be ordinarily at low occupancy and nursing personnel would likely be on vacation. I think such sensitivity is very often important to the success or failure of such projects in hospitals of this kind.

When you study staffing patterns, you have to take into account the role and function of the facility, the kinds of patients likely to be admitted by the medical staff, whether or not there is emergency service, whether or not it has an outpatient service, whethe it takes a broader range of patients or is confined to a few. In effect, you must consider the inflow of patients the nursing staff must care for.

We were interested in some of the more traditional outcome factors such as the potential relationship of nurse staffing patterns and occupancy levels to length of patient stay. We used Dr. Aydelotte's scales to see whether patient welfare would be in any way affected. We checked the possible effects of basic demographic factors, medical diagnoses, and a number of basic medical behavioral factors on the dependent variables.

As it turned out, the length of stay did not vary significantly among any of the so-called study situations. The patient welfare measures and a number of other variables did not affect our results.

Prior to discharge, each patient was interviewed privately off the floor regarding the nursing and medical care he had received, how he liked or disliked his room, the layout of the unit and so on. We soon discovered a bias operating in favor of the radial unit. The radial unit was rather small, and we could quickly see a bond develop between the nursing personnel and the patients that we did not see at the same intensity on the angular unit.

Fortunately the interviewer, a social worker, was very skilled at interviewing and worked through the fact that many patients would simply not be critical of the nurses, more on the radial unit than on the angular unit, at the start of the interview. Finally, we did get some criticisms after piercing through the facade of being a "nice guy who didn't want to embarrass the nurses," and so forth.

But this was a reflection of the close relationship that developed in the circular unit. This was particularly true in those study situations of high occupancy and low staffing.

Another fact is that the patients on the radial unit could identify the different nurses by the caps and uniforms of personnel coming in and out of the unit, which they couldn't do on the angular unit. There were other indices of how patients empathized with the nurses more on the radial than on the angular unit. It was not the same for the doctors, I might add.

One of our main purposes in the project was to

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replicate many factors in a prior study conducted by Sturdavant and her associates *(4)* at Rochester, Minnesota. We wanted to see what factors we could replicate so we used at our facility a number of criteria similar to those in the Rochester study.

This is one thing needed in nursing care research—more replication in different kinds of facilities with different personnel to see if we derive the same or divergent results. So we used essentially the criteria for patient and nursing care that were used at Rochester, with some variations.

For example, we had six basic categories of major types of nursing care essentially defined as direct bedside care, which was basically composed of treatments, supportive care, ambulation and so on and communication directly with patients. Then we had indirect care, general assistance, standby, time out, and travel for patient purposes. The criteria used were similar to the Rochester measures to permit replication of these factors.

We took these criteria and categorized them into what we call medical, social, and physical care. The categories of the direct care activity involving treatments, where the activity was oriented toward the medical problem of the patient, were termed medical nursing care. Care that was geared toward physical comfort like adjusting the pillow, making the patient more comfortable, attending to physical needs of patients not related to their illness was called physical (bodily) care. The third was social, which involved communicating, nurses talking with the patient or observing the patient directly in case there was a need in terms of the social category.

We had another category termed patient-involved care. That is, such care was defined essentially as a combination of direct care, indirect care, and general assistance—all of which had directly to do with involving the patient as opposed to such factors as standby and time out. So we had ratios of time observed in these three activities compared to other activities, and this varied enormously. These are just some of the measures we developed in the course of the project.

Major Results

Type of Nursing Care

Since a major purpose of the overall original study was to replicate many facets of Sturdavant's Rochester study *(13)*, similar criteria and measurements of many variables were used in the present inquiry. Six major categories of nursing care were defined: direct (bedside) care, indirect care, general assistance, standby, time out, and travel. For the total of 12 previously mentioned study situations it was found that major types of nursing care differed significantly between the nursing units, as shown in table 1. (Percentage differences greater than 1 percent were statistically significant, because of the large size of the samples involved.)

It was found also that the highest percentage of nursing care observed was in direct, bedside care (30 percent), followed in order by standby, indirect care, general assistance, time out, and lastly in travel, when nurse staffing pattern, occupancy level and other characteristics were held constant statistically. On 204,793 observations on both nursing units for somewhat over a year each, approximately identical nursing staffs provided *more* indirect care, general assistance, and took more time out, and provided *less* direct care, standby, and travel on the radial units than on the angular unit.

An analysis of the six specific nurse staffing patterns designed for this study presented a somewhat different picture when shape of the unit and occupancy levels were pooled, as presented in table 2. For the quantitative staffing patterns, the high staffing pattern exhibited more time spent in

Table 1.—Major type of nursing care in an acute, general hospital

Type of Care	Number of observations	Percent	Rank
Direct care	61,338	30	1st
Indirect care	46,370	23	3rd
General assistance	19,567	9	4th
Standby	48,601	24	2nd
Time out	17,405	8	5th
Travel	11,512	6	6th
Total	**204,793**	**100**	

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Table 2.—Major type of nursing care, by six nurse staffing patterns

Type of care	Nurse staffiing pattern											
	High		Average		Low		High RN		High LPN		High NA	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
Direct care	12,261	26	10,821	32	8,456	32	7,988	35	10,632	31	11,180	28
Indirect care	9,849	21	7,832	23	6,161	23	6,170	27	9,240	27	7,118	18
General assistance	4,743	10	2,801	9	2,638	10	2,631	11	3,627	10	3,127	8
Standby	13,088	27	7,075	21	5,832	22	3,686	16	6,424	19	12,496	32
Time out	4,764	10	2,980	9	1,999	8	1,582	7	2,770	8	3,310	8
Travel	2,824	6	2,114	6	1,335	5	961	4	1,879	5	2,399	6
Total	**47,529**	**100**	**33,623**	**100**	**26,421**	**100**	**23,018**	**100**	**34,572**	**100**	**39,630**	**100**

Table 3.—Major type of nursing care, by nurse staffing patterns and by radial and angular units, percentages only

Staffing pattern	Major type of care (percent of observations only)											
	Direct		Indirect		Gen. Asst.		Standby		Time out		Travel	
	Radial	Angular	Radial	Angular	Radial	Angular	Radial	Angular	Radial	Angular	Radial	Angular
High	26	26	22	20	13	7	24	31	10	10	5	6
Average	31	34	25	21	9	8	20	22	9	9	6	6
Low	33	32	24	22	10	10	19	25	8	7	6	4
High RN	35	34	28	25	13	10	14	18	7	7	3	6
High LPN	29	33	27	27	11	10	20	17	8	8	5	5
High NA	27	29	19	17	8	8	31	32	9	8	6	6

standby followed in order by direct care, indirect care, equal amounts of general assistance and time out, and last in travel. There was an increase in standby and time out and a decrease in direct and indirect care compared to the percentages of time observed giving these types of care for the total staff.

Average staffing showed an increase in direct care and a drop in standby compared to the total staff. Low staffing also exhibited an increase in direct care and less standby than for the average staffing pattern. For qualitative patterns, the high RN pattern showed an increase in direct care, indirect care, and general assistance but a decrease in standby and travel. The high LPN pattern exhibited an increase in indirect care and a decrease in standby, and the high NA pattern indicated an increase in standby and a decrease in direct and indirect care compared to the total staff percentages for such care.

Thus, major types of care seemed to vary more for the qualitative than for the quantitative nurse staffing patterns, although type of care was affected by all of the staffing patterns differently when occupancy level and shape of the unit were pooled or held constant.

Were these major types of care for each of the patterns affected by the shape of the unit? Table 3 shows that type of care provided on the two units did indeed differ for the six nurse staffing patterns. For the quantitative patterns, high staffing increased time spent on general assistance and decreased standby on the radial unit, but the opposite occurred on the angular unit. Average staffing increased time on indirect care on the circular unit and decreased such care while increasing direct care on the angular unit. Low staffing showed opposite results primarily in standby, dropping on the radial unit and increasing on the angular unit.

For the qualitative patterns, increased time occurred for general assistance with a drop in standby for the high RN pattern on the circular unit, while indirect care decreased and standby and travel increased on the angular unit. Direct care dropped on the radial unit, but increased while standby decreased on the angular unit for the high LPN pattern. Apparently, the high NA staffing pattern was not significantly affected by shape of unit since type of care on both resembled closely that of this staffing pattern totally, although small differences occurred for type of care between the two units.

Thus we find that both nurse staffing patterns and the physical design of the hospital unit affected the major type of nursing care provided to general medical and surgical patients. Adding additional nurses to the staffing pattern when shape of the unit was ignored led to *more* standby and time out and *less* direct patient care.

This resembles similar findings by Aydelotte and her associates (3) when compared to the average staffing pattern. The low quantitative staffing pattern devoted similar percentages of time to direct and indirect care as for the average staffing level. But the qualitative staffing patterns indicated more effective differences in type of patient care, particularly for the high RN pattern where significant increases in direct and indirect care and general assistance occurred compared to the lesser quality staffing ratios.

The physical shape of the nursing unit seemingly affected the types of care given for most of these staffing patterns. Increasing the quantity of nursing staff had differing results on the two units. For the radial unit an increase in indirect care and general assistance occurred more than for the angular shaped unit, with standby differences difficult to assess. Varying unit shape led to opposing changes in type of care when changes did take place for identical staffing patterns. Indirect care, general assistance, and standby were most affected by the radial shape, but direct and indirect care, general assistance, and standby were most affected by the angular unit although in opposite ways.

Even so, the radial unit seemingly had more effect on type of nursing care provided by qualitatively different than by quantitatively divergent staffing patterns. The high RN pattern gave more indirect care and general assistance with less travel and standby on the circular than on the angular unit. The high LPN staffing pattern gave more direct care on the angular than the radial unit. Shape of the unit, therefore, had more effect on the high levels of quality of nursing care (RN) and the least influence on the lowest level of care (NA). This was further confirmed when the major types of care for specific nursing personnel were analyzed.

Head and charge nurses on the radial unit provided *more* indirect care and general assistance and *less* standby than on the angular unit. RN's gave *more* general assistance and *less* direct care and travel on the radial than on the angular unit. LPN's on the radial unit gave *more* indirect care and general assistance and *less* standby than on the angular unit. NA's traveled *more* and gave *less* direct care on the radial than on the angular unit.

In studying the effect of nurse staffing patterns and design of the nursing units, the need to control for differences in occupancy levels and stages of illness is obvious. A separate analysis of the results was made in terms of high and low levels of occupancy of the study units. This revealed significant differences in type of care provided for the staffing patterns and shape of the units, as differential demands for patient care were affected by these patient levels. Consequently, our efforts to control for such divergences when analyzing the effects of staffing and shape of the unit were empirically justified.

The type of care most affected was direct care. For example, by and large there was more direct care given in the angular unit than in the radial unit, although it was "easier" to give it in the radial unit. Also to our surprise, there was less social care in the radial than in the angular unit; that is, less verbal communication between patients and nurses on this type of unit.

So we had to come up with some answers as to why this happened. Did the shape of the unit have anything to do with this or what was going on between the staff and patients or what? The circle is architecturally the most rigid, inflexible shape, and the only way to expand a circular unit is to add floors vertically like stacking pancakes. It cannot expand laterally as can an angular unit or other shapes. Yet, on most nurse staffing patterns we found far more flexibility in what care is given by whom in the circular than in the angular unit. I think that is why the registered nurses preferred it, because they were able to exercise more options in giving care to patients by the very fact that they could see the patient from the station. They could sit in the station (sit down because the counter is low), and they could look into every room and see whether the patient needed care or not. You can't do that in an angular unit because you don't have that visibility. In the angular unit, when a call light came on in the station, the head nurse might delegate an aide, to "Go see what Mrs. Jones wants." But in the radial unit she could look up and see whether she was needed. She could exercise options in the delivery of nursing care that she could not do in a differently shaped unit.

So I think, because of this, there was a preference for the radial unit by the RN's. They could exercise more professional nursing judgment in providing care. There was a lot of nonverbal communication going on between patients and nursing staff—waving and smiling at each other—but they didn't go into patients' rooms and visit as much. So there was a kind of *vicarious care* going on between the staff and the patients in the circular unit.

Now, we got into some very difficult study situations where we really overloaded the staff. We were almost risking the well-being of the patients, but we would terminate the study situation before actually jeopardizing the welfare of any patients. During these overloaded situations, many patients, when we interviewed them, said they never touched the call light in a 2- or 3-week stay, and we asked them why. "Well," the patients would say, "the nurses were too busy. I didn't want to bother them." They could see the nurses in the unit running around helter skelter sometimes, and they didn't want to bother them. They felt that, "If I need help, they'll come," so they had this confidence in the nursing staff in the radial unit.

We didn't find that in the angular unit. They would sometimes get lonely and just want to see if anyone were still out there because they hadn't seen them in a while. So they pushed the call light.

When we examined the factor of nurse initiated visits versus patient initiated visits, we found that about 82 percent of the trips to the patient's room in the radial units was initiated by the nurses compared to about 79 percent on the angular unit. Well, you may think this doesn't make sense since sometimes they may not need to make a trip to the rooms because they can see in. But a related finding was that the average length of time spent in the patient's room per nurse visit was far less on the radial than on the angular unit.

Why? What happens? You can do a temperature check and you pick up the tray and maybe you do some comfort things in one trip in the angular unit, and those tasks can accumulate into several functions per visit. A lot of them involve talking and socializing with the patient, which you don't see in the radial unit because the nurses don't feel there is as much need for it in the radial unit as in the angular unit. This is part of the relationship between patient and nurse.

We could almost predict the day patients in the circular unit would be discharged. One of the things that happens when patients get out of intensive care in this type of unit is that as they are convalescing, feeling better after the crisis has passed, they start closing the cubicle curtain because they don't want to be bothered. They want privacy and want to read or watch TV. They leave their room, go to the lounge or the coffee shop, and use other parts of the hospital more while convalescing on the radial unit than they do the angular unit. The "curtain pulling syndrome" was directly related to convalescence, and we recorded the halfway pull, all the way pull, and finally when it started to be closed all the time we knew the doctor was going to discharge the patient because he was ready to leave. This occurred only on the circular shaped unit.

A number of other events occurred that you don't ordinarily take for granted. What goes on in the nighttime in different units? This is where we had some problems with the radial unit because of the architecture. One patient, because the drape next to the outside window wouldn't quite close, complained about being bothered by noises. We found there was a street light by her window, and the slightly opened drapes allowed a sliver of light to come into her room all night long.

We found these things out when we interviewed the patients. It is amazing what you can learn about hospitals from patients, about a lot of little things. The night light in the nurses' station bothered one room but it didn't bother any of the other rooms on the radial unit because of the shape and room location. Also, the drug cabinet was a problem in the radial unit because access to the radial unit nurses' station was easier.

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Now one other thing about our discovery was that a number of physicians, in fact every physician whom we interviewed, had patients to whom the radial unit was contraindicated. This was not as much for medical as for personality reasons, but none of the physicians had any contraindications against putting patients into the angular units. This meant that if this hospital went strictly to radial units it would lose about 20 percent of its occupancy because the medical staff would admit that many patients to a facility with other shaped units—not for intensive care, that is, but only for intermediate care.

I should mention too that we were further surprised when we did this same kind of study for self-care patients. The radial unit was designed for intensive care so that nurses could constantly observe patients who need this type of monitoring, not electronically but by eyeball, with minimum effort. When we dropped to the intermediate level we had problems. When we dropped to the minimal self-care needs we were surprised. The self-care unit was far better from the standpoint staff and patients in the circular than in the existing angular self-care facility.

Medical, Physical, and Social Types of Direct Patient Care

Direct care was examined in terms of three subcategories. These were *medical*, measured by the frequency of tests, measurements, IV therapy, preoperative care, medication and prescription administering (treatments as a major category); *physical*, measured by frequency of providing bathing and grooming, comfort, meals, and courtesy services, elimination and ambulation services to patients (general supportive care); and *social*, indicated by direct bedside communication and observation of patients. It was found that more physical care was provided, followed by medical care and last social care, as presented in table 4. Between the two units, no differences occurred in medical care, but more physical and less social care occurred in the radial than in the angular unit.

For the nurse staffing patterns, the total pattern of such care did not differ for the high staffing pattern. Less social care occurred for the average pattern and less medical and more physical care occurred for the low staffing pattern (table 5). For the qualitative patterns, more medical and less

Table 4.—Medical, physical, and social types of direct care, by number of observations and percentages, total study, by shape of unit

Type of care	Total		Radial		Angular	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*
Medical	23,057	38	11,199	38	11,858	38
Physical	29.631	48	15,135	51	14,496	46
Social	8,650	14	3,446	11	5,204	16
Total	**61,338**	**100**	**29,780**	**100**	**31,558**	**100**

Table 5.—Type of direct patient care, by nurse staffing patterns

	Nurse staffing pattern											
Type of care	High		Average		Low		RN		LPN		NA	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
Medical	4,594	38	4,232	39	3,000	35	3,238	41	4,220	40	3,773	34
Physical	5.628	48	5,264	49	4,363	52	3,896	49	5,014	47	5,465	49
Social	1,739	15	1,324	12	1.093	13	854	10	1,398	13	1,942	17
Total	**11,961**	**100**	**10,820**	**100**	**8,456**	**100**	**7,988**	**100**	**10,632**	**100**	**11,180**	**100**

Table 6.—Type of direct patient care by nurse staffing patterns, by radial and angular units, percentages only

Staffing pattern	Type of direct care (percent only)					
	Medical		Physical		Social	
	Radial	Angular	Radial	Angular	Radial	Angular
High	40	37	51	43	9	20
Average	39	39	50	47	11	14
Low	34	37	55	48	11	15
High RN	39	42	51	46	10	12
High LPN	39	40	51	44	10	16
High NA	36	32	50	48	14	20.

social care occurred for the high RN's, more medical care for the high LPN's, and more social care and less direct care took place for the high NA pattern when compared to the total staff results (table 5).

When such staffing patterns were analyzed by the two shaped units, significant divergences again occurred as shown in table 6. The quantitative staffing patterns showed increases in medical and physical care and reduced social care at high staffing on the radial unit and an opposite result on the angular unit. The angular unit caused more divergences at average staffing level on the angular than on the circular unit, increasing social and reducing physical care. Low quantitative staffing had opposite results for these forms of care on the two units. Qualitative differences in staffing also had differing results on the two units. High RN staffing exhibited more physical and less medical care on the radial unit and more social and less physical care on the angular unit.

Opposing results also took place for the high LPN pattern on the radial and angular units. There was more physical and less social care on the former than on the latter unit. The high NA pattern indicated an increase in medical and a decrease in social care on the radial unit and an opposite result on the angular unit (table 6). Again, the physical shape of the nursing unit affected the types of direct patient care provided by the various nurse staffing patterns.

Patient Involved Care

Patient involved care is measured by the ratio of direct bedside care combined with indirect care and general assistance to nonpatient involved activity (standby and time out), all derived from the preceding data. As presented in table 7, the ratio of such types of care for the total staff was nearly 2 to 1 (1.93) for patient involved to nonpatient involved care. For the specific nurse staffing patterns, the highest ratio was found for the high RN pattern (3.2), followed by the high LPN (2.6), average staffing (2.1), high and low staffing (1.5 each), and lastly the high NA pattern (1.3), (table 7).

Physical design of the nursing unit had a significant effect on these ratios of patient involved to nonpatient involved care for all six staffing patterns as shown in table 8. Such care increased for all three quantitative patterns and the high NA pattern and decreased for the high RN and high LPN patterns on the radial shaped unit. These ratios decreased on the angular unit for high and average staffing and high RN and increased for the low staffing and high LPN and high NA patterns on this latter unit.

Table 7.—Ratios of patient involved to nonpatient involved care, by total staff and by nurse staffing patterns

A. Total staff: DC, IC, GA / Standby, T.O. = 127.275/ 66.006 = 1.93

B. Staffing pattern	Pt. invol.	/ Non-pt. invol.	Ratio
High	= 26,853	/ 17,852	= 1.5
Average	= 21,454	/ 10,055	= 2.1
Low	= 17.255	/ 11,831	= 1.5
High RN	= 16,789	/ 5,268	= 3.2
High LPN	= 23,499	/ 9.194	= 2.6
High NA	= 21,425	/ 15,806	= 1.3

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Table 8.—Ratios of patient involved to nonpatient involved care, by nurse staffing patterns and radial and angular units

Staffing pattern	Shape of nursing unit	
	Radial	Angular
High	1.8	1.3
Average	2.2	2.0
Low	2.4	2.0
High RN	3.6	2.8
High LPN	2.4	2.8
High NA	1.4	1.4

Other differences in this ratio of care took place between the two units for these staffing patterns. The radial unit exhibited more patient involved care than the angular unit for all quantitative staffing patterns. As quality of staffing dropped, patient involved care also decreased on the radial unit.

Amount of Nursing Care

The amount of nursing care is measured quantitatively by the number of trips by the nursing staff to the patients' rooms in the two study units and more specifically when such trips are initiated by the nurse and by the patients' calls. This factor was observed only during the day shift when such activity is most likely to occur. As illustrated in table 9, the nursing staff initiated by far the most trips (79 percent during the total project, while staff-to-staff trips were the least (1 percent), with patient initiated trips very low (3 percent).

When the average number of total trips per day and those that were nurse initiated were compared to those initiated by patients in the units by the six nurse staffing patterns, it was found that the high NA staffing pattern had the highest average number of total trips per day. This was followed in order by high staffing, high RN, average staffing, high LPN, and lastly low staffing, indicating a mixed pattern of trip activity (table 10). However, the ranking shifted somewhat when the average per diem number of nurse initiated trips was examined. High staffing showed the highest average number of such trips followed in order by high NA, average, high LPN, and finally low staffing.

The average number of patient initiated trips was far lower than nurse initiated trips. Average staffing had the highest daily average followed in order by high staffing and high RN (tied), high NA, high LPN, and low staffing patterns. The low staffing pattern was the lowest in such trips, and high NA, high staffing, and average staffing patterns were highest in total average trips, nurse initiated trips, and patient initiated trips in that order.

The average number of total trips to patient rooms was more affected than nurse initiated trips and patient initiated trips, as presented in table 11. Only the high NA pattern had a higher average total of trips on the radial unit, and a decrease was noted for the remaining patterns, except for average staffing when no change was found. On the angular unit the opposite result occurred with an increase in the average number of total trips for high and low staffing and for high RN and high LPN. A reduction occurred for high NA staffing and no difference was found for the average staffing pattern, which was true also on the circular unit for this pattern.

For nurse initiated trips, fewer but sufficient differences occurred for the nurse staffing patterns. There was a decrease in such trips on the radial

Table 9.—Types of trips to patients' rooms by nursing staff in radial and angular units, by number of observations and percentages

Types of trips	Total		Radial unit		Angular unit	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*
Nurse initiated	118,444	79	60,772	82	57,672	76
Patient initiated	4,235	3	2,100	3	2,135	3
Trips—pts. absent	11,843	8	5,619	7	6,224	8
Trips—no pts. involved	13,121	9	4,495	6	8,626	11
Staff to staff	2,409	1	1,251	2	1,158	2
Total	**150,052**	**100**	**74,237**	**100**	**75,815**	**100**

Table 10.—Average daily number of trips to patients' rooms by nurse staffing patterns, by total trips and by types of trips

Staffing pattern	Total trips	Nurse initiated	Patient initiated
High	732	688	21
Average	665	523	22
Low	589	485	14
High RN	675	496	21
High LPN	626	497	16
High NA	797	638	18

unit for high and average staffing and for high RN staffing, an increase for the high NA pattern, and no change for the low and high LPN staffing. On the angular unit, decreases in such trips occurred for the high, average, and low staffing patterns and also for the high NA pattern. No change took place for the high LPN pattern. For patient initiated trips, only the high staffing pattern showed a change. There was a decrease in average number of such trips on the radial unit, and an increase occurred for this high staffing pattern and a decrease for the high RN staffing pattern on the angular unit.

Thus both staffing pattern and shape of unit exhibited differential effects in the amount of nursing care provided in this study.

Utilization of the Unit by Nursing Staff

Since differences in nursing care were found for all of the preceding variables in terms of nurse staffing patterns and physical design of the units, it is of special interest to analyze how the nursing personnel utilized these units. Table 12 shows that the nurses were observed spending the greatest amount of their time in the nurses' station (34 percent). Following in order were the patients' rooms when the patient was present, nurses' conference rooms located within the units, off the

Table 11.—Average daily number of trips to patients' rooms by types of trips, by nurse staffing patterns, and by radial and angular units

Staffing pattern	Type of trip to rooms (daily average)					
	Total trips		Nurse initiated		Patient initiated	
	Radial	Angular	Radial	Angular	Radial	Angular
High	705	759	617	586	15	14
Average	664	665	545	502	20	22
Low	557	621	488	462	15	14
High RN	646	705	487	505	22	19
High LPN	593	659	500	495	17	16
High NA	853	742	692	585	18	19

Table 12.—Utilization of nursing unit by total nursing staff in radial and angular units, by number of observations and percentages

Unit subarea	Total		Radial		Angular	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*
Nurses' station	73,399	34	39,985	37	33,414	31
Medication area	9,313	4	4,850	4	4,463	4
Corridor in unit	17,634	8	8,393	8	9,241	9
Patients rooms	46,608	22	22,002	21	24,606	23
Utility room	2,750	1	815	1	1,935	2
Tub and shower room	1,064	*	657	1	407	*
Nurses' conference room	34,574	16	14,010	13	20,564	19
Off unit	24,380	11	13,068	12	11,312	10
Other areas in unit	5,377	3	3,009	3	2,368	2
Total	**215,099**	**100**	**106,789**	**100**	**108,310**	**100**

*Less than 1 percent.

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entire unit, corridors within the units, medication area, miscellaneous areas in the unit, patients' rooms when the patient was absent, utility room, and lastly, in the tub and shower room in the unit.

Under conditions of differing nurse staffing patterns, the nursing personnel were found to utilize the two units somewhat differently than for the total study, as illustrated in table 13. For the quantitative staffing patterns, high staffing personnel used the nurses' conference room and were off the unit more and spent less time in the nurses' station and in patients' rooms when patients were present. Average staffing indicated an increase in time in patients' rooms when patients were present and a reduction in time in the conference room. Low staffing increased time in patients' rooms only when patients were present.

For the qualitative patterns, high RN staffing led to an increase in use of the nurses' station, medication area, and patients' rooms with patients present, and a decrease in use of the conference room and in being off the unit. High LPN staffing led to more time in the nurses' station and to less use of the conference room. The high NA staffing pattern led to increased use of the conference room and decreased time spent in the nurses' station and medication area.

For each nurse staffing pattern observed on the two units some interesting differences were found in utilization of these subareas in both units, as shown in table 14. High quantitative staffing led to an increase in use of the nurses' station and in being off the entire floor and a decrease in time spent in patients' rooms while the patient was present and in the nurses' conference room on the radial unit. Use of the conference room increased on the angular unit and use of the nurses' station decreased. Average staffing brought about an increase in use of the nurses' station and a drop in time spent in patients' rooms, patients present, and use of the conference room on the circular unit. The opposite occurred on the angular unit. Low staffing resulted in an increase in time off the floor and a drop in use of the conference room.

In terms of the qualitative staffing patterns, high RN staffing led to an increase in time in the nurses' station and patients' rooms with patients present and a decline in use of the corridors and nurses' conference room on the radial unit. There was an increase in use of the conference room and a decrease in time spent in the nurses' station and patients' rooms with patients present, on the angular unit. High LPN staffing on the radial unit showed a drop in use of patients' rooms with

Table 13.–Utilization of nursing unit by nurse staffing patterns, by number of observations and percentages

Unit subarea	Nurse staffing pattern											
	High		Average		Low		RN		LPN		NA	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
Nurses' station	16,471	32	12,248	35	9,679	35	8,699	36	14,265	40	12,742	30
Medication area	2,065	4	1,574	4	1,239	4	1,450	6	1,829	5	1,046	2
Corridors	4,646	9	3,152	9	2,200	8	1,571	7	2,926	8	3,563	9
Patients' rooms, patients in	8,534	17	7,878	23	5,951	22	5,558	23	7,273	20	8,378	20
Patients' rooms, patients out	1,035	2	346	1	420	1	482	2	366	1	632	2
Utility room	780	1	510	1	348	1	360	1	363	1	629	2
Tub and Shower room	258	*	181	*	76	*	22	*	199	*	399	1
Nurses' conference room	9,861	19	4,903	14	4,171	15	3,264	14	4,044	11	8,607	21
Off unit	6,955	13	3,325	10	2,741	10	2,296	9	4,387	12	4,814	11
Other areas	1,026	2	882	2	829	3	470	2	927	2	1,055	2
Total	**51,631**	**100**	**34,008**	**100**	**27,654**	**100**	**24,172**	**100**	**36,579**	**100**	**41,865**	**100**

*Less than 1 percent.

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Table 14.—Utilization of nursing unit by nurse staffing patterns and radial and angular units, by percentage of observations only

Unit subarea	Nurse staffing pattern and unit (percent only)											
	High		Average		Low		RN		LPN		NA	
	Radial	Angular	Radial	Angular	Radial	Angular	Radial	Angular	Radial	Angular	Radial	Angular
Nurses' station	37	27	39	31	35	35	39	33	39	39	36	25
Medication area	4	4	5	4	5	4	6	6	5	5	3	2
Corridors	9	9	8	10	9	7	5	8	8	8	8	9
Patients' rooms, patients in	15	18	21	24	21	22	25	21	18	22	19	21
Patients' rooms, patients out	2	2	1	1	1	2	2	2	1	1	1	2
Utility room	1	2	1	2	*	2	1	2	1	1	1	2
Tub and shower room	1	*	*	*	*	*	*	*	1	*	1	*
Conference room	14	24	12	16	13	17	11	16	12	10	16	25
Off unit	15	12	10	9	12	8	9	10	12	12	12	11
Other areas	2	2	3	2	3	3	2	2	3	2	3	2

*Less than 1 percent.

patients present and the opposite result on the angular unit. The high NA staffing pattern exhibited an increase in use of the nurses' station and a decrease in time spent in the nurses' conference room on the radial shaped unit, with the opposite result on the angular unit.

Thus, in most staffing patterns, directly opposing results in utilization of various subareas of the nursing unit took place between the two physically shaped units. This again indicated some effects of such design on nurse staffing patterns.

Conclusions and Discussion

Space permits only the mention of some major conclusions from our findings. As indicated by the measurements employed, nursing and patient care differed both in terms of nurse staffing pattern and the physical design of two divergently shaped nursing units in an acute care general hospital. The results were not always uniform or predictable. Both quantitative and qualitative nurse staffing pattern differentials were affected differently by the two divergently shaped nursing units for different variables related to patient care and utilization of the unit by nursing personnel.

Undoubtedly, part of the reason for varying results was the rather gross measurements employed in this study. Most of the data were of the enumerative type with simple percentages of the major measurement data. It seems likely that more precise measures of nursing and patient care than were available for this study may well have produced more detailed and precise differences in care provided by the different staffing patterns. Also, expanding the divergency in physical designs beyond merely the circular and L-shaped angular types included in this study may have revealed even more differences in impact on patient care. The same could well hold for expanding the different types of nurse staffing patterns along both qualitative and quantitative lines for additional divergences in results related to patient care.

Only the most basic types of patient care were reported here, and such variables would be easily extended into many other phases of such care, even with the same level of gross measurement. We should perhaps also suggest that our overall findings might have differed with other nursing personnel in other hospitals, to mention only a few necessary qualifications of the results of this study.

Our major conclusion nevertheless remains that hospital physical design affected differentially the patient care provided by six different nurse staffing patterns for general medical and surgical patients at the intermediate level of nursing care. From a strictly research standpoint, then, investigations of nurse staffing patterns should take the physical setting into account as a potential factor affecting the outcome of such research. Omitting these considerations and potential effects will likely bias or distort the results of such research on nurse staffing patterns.

Our study suggested a number of theoretical problems. First of all, to return to Dr. Aydelotte's suggestion that we need theory, I think we have to start to do some pure basic research on just what we mean by *care*—not care in the nursing sense or medical sense but care in general. I regard care as basically a *social* phenomenon. The "caring" relationship is defined by society and culture. We can break the societal definition down into "hospital care" and then into categories of "patient care," "nursing care," "medical care," and so forth. We need to do the type of basic research whereby we can delineate specific dimensions of the caring relationship that can be controlled or enhanced when specified for patient care.

Some of the medical staff of the hospital where our study was done would like ideally for the hospital admitting office to pick out that room and that bed that would maximize the personal, physical, and medical needs of that patient. We dreamed about this, for we found that there were a lot of personality factors involved in both positive and negative reactions to the unit, to certain nurses, to certain physicians, the way they were taken care of, and so on. Such reactions had a lot to do with the room and the whole setting in which all of this kind of care, the total medical care, was given to patients.

These are some of the things that we touched on in our study and some conclusions we reached as a result of the study.

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DISCUSSION OF DR. JACO'S PAPER

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Dr. Jacobs

I was most impressed by the experimental design of Dr. Jaco's study. The number of variables he was able to manipulate in a controlled situation is not often encountered in hospital research. The study was more like an investigation carried out in a laboratory than one performed in an operating organization. He is to be commended for "selling" the hospital management on cooperating in the research.

Dr. Jaco, as most of you know, is a sociologist. I, by training, am an industrial psychologist. Very few nursing or personnel research studies in hospitals are being designed and directed by individuals with degrees in the social sciences. Most such studies reported in the literature have been conducted by industrial engineers. They have made many significant contributions. I do not believe, however, that most of them would conceive of experimental designs as sophisticated as that described by Dr. Jaco.

Although I have been out of industrial psychology for some time, I still scan the journals of this discipline. Very seldom do I see articles describing research in a hospital setting by psychologists, other than clinical psychologists In fact the only one that comes to mind is a study at Iowa State in which size of staff and personal relations training for nurses were varied in order to determine impact upon patient reaction to care received.

The rapid growth in the number of industrial engineers working in the hospital field was greatly stimulated by the Kellogg Foundation. Perhaps the entry of a substantial number of social scientists could be similarly stimulated by the U.S. Department of Health, Education, and Welfare (DHEW). The American Psychological Association (APA) is located in the Washington area. As a starter, DHEW might make arrangements for a symposium at the APA convention to point out some of the hospital and nursing problems and to inform psychologists of the research opportunities.

In some cases there is already a sufficient body of psychological knowledge to predict the outcomes of staffing decisions. Earlier today Dr. Jelinek pointed out that nurses are reluctant to float when they are identified primarily with units in which morale is high, but they are willing to float from units in which morale is low. Most psychologists would have predicted this finding.

My basic appeal in these comments is that, through research, social scientists should be able to make a significant contribution to the solution of many of the problems we have been discussing in this conference. In addition, they could certainly assist hospital management in making personnel decisions.

I had hoped when I first saw the title of Dr. Jaco's paper that he was going to tell us which was "best," radial or conventional units. He did not do that. However, he told us of a wealth of other findings discovered during the course of the study.

In regard to hospital architecture, there are two reports recently prepared for the Department of Defense concerning a "new generation of military hospitals." I procured them because I was interested in what they had to say about computerization. The two reports consist of nine and seven volumes, respectively. One was prepared by Westinghouse and the other by Arthur D. Little. They have a good deal to say concerning architecture for hospitals and nursing units therein.

Finally, I strongly concur in Dr. Jaco's comment about replication of researches. In psychology, replication of researches (or cross validation of personnel tests) is most important before one accepts findings with no reservations. We seldom do this in hospital research. No matter how sophisticated our statistical tests, significant studies should be replicated before findings are accepted, as doctrine and decisions are based upon them.

Impact of Administrative and Cost Factors on Nurse Staffing

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To explore the impact of administrative and cost factors on nurse staffing, one might use the model developed by Scott, which implies that the policies and operating procedures of a hospital at any given time represent the sum of two influences. These are the influences generated by forces from the outside environment and those generated from within the organization by professional and employee attitudes and knowledge (*1*). In the case of nursing, the parties to the negotiation bring quite divergent backgrounds and therefore have, as a result, quite different sets of cognitive information, attitudes, and values. The bargaining process would incorporate the usual searches for mutually acceptable solutions, compromises, and innovations that meet or at least partially satisfy multiple goals simultaneously. The principal parties from the outside environment would be third party financing agencies, trustees, and hospital administrators. From within the organization, they would be the professional and employee groups of nurses, doctors, and nonprofessional nursing employees.

While this model of the establishment of nurse staffing policies is simplistic, it suggests that the term "administrative and cost factors" would be all those demands and desiderata of the outside parties. Such a list is constantly changing and is potentially quite lengthy. If the major goals of the outside bargainers are postulated, it is possible to predict something of the nature of the outcome of the bargaining process. This then can be a guide to understanding the current evidence on the actual state of nurse staffing and to drawing some tentative conclusions on the accuracy of the model and postulate. Finally, the model can frame speculation upon the impact of the major changes in the demands of the outside parties that currently appear possible.

Obviously, there are some weaknesses in this approach. Any assumption about the goals of individuals or groups is subject to question. The lists of both outside and inside parties have been arbitrarily curtailed, and because of the pressure of time, the limited power of our analytic tools, and the shortage of empirical evidence, we will be limited to some general conclusions.

Problem Definition

The goal of nurse staffing is delivery of an appropriate quantity and skill level of nursing service to each individual patient. The issues that must be resolved are the definitions of appropriate quantity and appropriate skill level and the mechanisms of delivery, including the tolerances to which the final nurse staffing system is to be held. These issues are related to, but can be separated from, a variety of organizational parameters that influence the outcome. The organizational parameters include the training and recognition of capability of each of the possible skill levels, the physical facilities of the wards, the nature of supervisory and management structure under which patient care is given, and the organizational structure of the hospital in which the nursing staff performs.

For example, one might assume that the upgrading of registered nurse skills to the baccalaureate level would influence the relative quantities of registered nurses and practical nurses. Similarly, decisions that registered nurses may draw blood specimens or that they are responsible for admitting histories would influence the appropriate quantities of RN skill levels. The architecture of the patient care units might affect the staffing (*2,3*), and so might decisions that change the management style of the head nurses and higher levels of supervision (*4*), and so would organizational decisions that create patient unit management departments.

The goal definition suggests that once these organizational parameters have been fixed there exists a unique quantity of nursing resource that would be judged appropriate to the needs of any given patient for a given time period, such as a day or a shift. This seems to be consistent with most thought on the problem. Such comment as there is on the appropriate level of care is given in hours per patient days (*5*). Many of the existing empirical investigations tend to treat this as having face validity as the dependent variable (*6*). Further, there appears to be a consensus that the appropriate quantity and skill level for an individual patient is a function of the severity of his illness (*7,8,9*).

The bargaining model suggests that the eventual definition of "appropriate" will be negotiated. That does not preclude the use of substantial factual material. In fact, one might infer that if the bargaining were proceeding normally, a wide variety of both evidence and argument would be introduced. The lines of argument will follow recognizable patterns, however, of which two are perceptible. These can be labeled the engineering argument and the economic argument.

Engineering Approach

The more commonly encountered definition of the appropriate quantity of nursing service could be labeled as an engineering approach, both because engineers frequently use it (*10*) and because it can be traced to Taylor's (*11*) analysis of job shop time standards. This approach assumes there is a fixed, describable quantity of activities that must be performed for a given patient in a given time period. Further, given a set of organizational parameters, the incremental times for each of these activities or the total time for the full set can be measured by standard work measurement techniques. This approach implies that at least a major portion of nursing care can be described in terms of discrete, identifiable, measurable components, and that for any given patient there is reasonable consensus as to which of these components is appropriate.

The approach has a reasonably successful history in industrial job shops. The underlying assumptions, however, have not been tested in a nursing environment. While existing work shows that time estimates can be made with satisfactory variances for both large and small components of activity, the author is not aware of any work that shows consensus on the components desirable for specific patients. Neither has it been demonstrated that the components are truly additive.

Another difficulty has been overlooked. That is that in the industrial job shop it is the usual practice for management to specify exactly what should be done, but in the hospital it is the usual practice for management to delegate to the registered nurse in charge of the patient the identification of the patient's needs and the work to be performed. Even if nursing supervision were willing and able to approve nursing care plans or some other specification of work for individual patients, it is quite difficult to determine whether these specifications have been met.

At the present time there appear to be no practical systems for assessing the quality of the result. Thus, while the engineer may measure to his heart's content what he thinks might be done for the patient, the nurse on the floor will continue to do what she thinks is desirable for the patient. The two decision systems can coexist nicely so long as the engineer does not force the nurse into a situation where she is routinely dissatisfied with her professional performance or her work pace.

Economic Approach

The other approach to the question of the appropriate quantity and skill level of nursing care can be called an economic approach. Although it is conceptually at least equally appealing, it has received very little attention in the literature. This approach would assume that nursing care is a resource sought by a consumer or a physician on his behalf because he perceives that it has some utility for him. Thus, in some more or less imperfect fashion, the amount of nursing care that will be judged appropriate can be predicted by economic theories rather than by strictly empirical considerations as the engineering approach would suggest. Under these theories, nursing care has a certain utility, and the utility is generally dependent upon the quantity of care received.

Although it is difficult to define this relationship, the marginal utility, or the value of an additional increment of a given good or service, is generally envisioned as a downward sloping curve, as shown in figure 1. If we can assume for the moment that a typical hospital patient buys his own nursing care, this relationship is not unreasonable. The first care that he receives may be lifesaving, and therefore he would value it infinitely highly. As the quantity goes up, the utility of additional units goes down and eventually reaches a value very close to zero.

At least theoretically, it is now possible to decide the appropriate amount of care. It will be that amount at which his perception of the marginal utility of a given number of dollars of expenditure on nursing care is equal to his perception of the utility of the same number of dollars if spent for other goods and services. Since he will also buy every other good and service according to the same standard, he will make alternative purchases as, for example, between nursing care and laboratory services, until their marginal utilities are also equal. This means that he will purchase nursing care over any alternative service until he has purchased the quantity of nursing care where its marginal utility is exactly equal to the marginal utility of the last quantity of another service that he purchased.

Put another and more concrete way, the patient will spend $10 for nursing care so long as he feels he can afford the $10 and so long as he feels that $10 worth of nursing care is at least as valuable as $10 worth of laboratory service or any other good or service available to him. The equilibrium that is reached will be a function of the following:

- the patient's income, because this determines how willing he is to spend the money;
- the patient's preference or tastes, because these determine on what he wishes to spend his money;
- the nurse's income, because this determines the cost of the marginal unit;
- the state of health care technology, because this determines the utility of a given physical quantity of nursing resource and also the utility of other goods and services;
- the general economy, because this influences not only the relative incomes of the patient and the nurse but also the relative incomes of other resources, including both labor and capital resources.

To summarize the economic approach, one might assume that the appropriate quantity of nurse staffing, then, is determined by people's perceptions of relative incomes of patients and nurses, by technology, and by the desirability of spending money generally for health care.

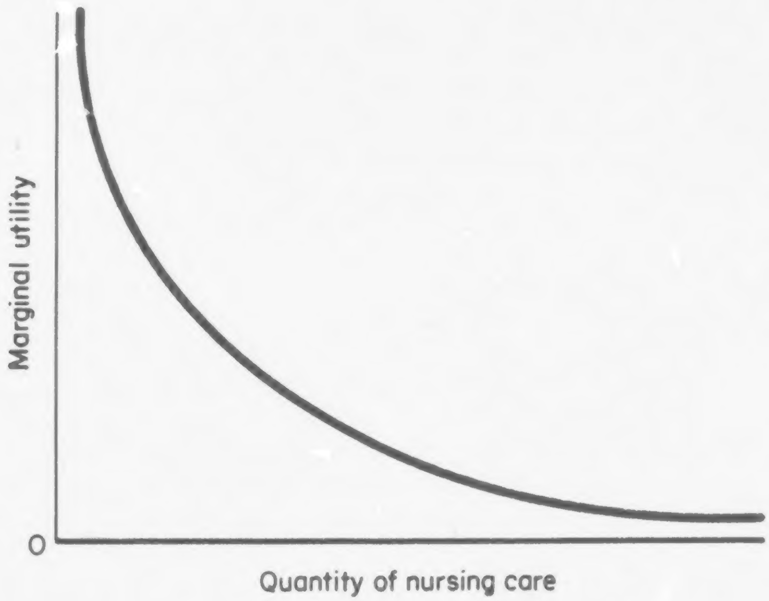
Patients, of course, do not purchase their own nursing care. The decisions that must be made are collectivized in several different ways. The nursing resource is provided to a nursing unit, the quantity of resource available is sometimes limited, the impact of the patient's personal income is to a large extent alleviated by third party payment mechanisms, and the problem of evaluating the marginal utilities of various hospital goods and services is assigned to the bargaining process between the outside parties and the nurses and other professionals within the hospital. In this regard, however, it must be noted that while the physician acts as the patient's agent in selecting the quantities of most of the other goods and services in the hospital, it remains the nurse who makes most of the decisions in regard to nursing care.

In some ways, this collectivization is an important asset to our problem. If the severity of illness is a random phenomenon, it is reduced by treating patients in groups. The elimination of individual patient income from consideration is clearly desirable. There are a number of obvious economies that result from grouping patients. Finally, the data from the engineering approach are not discarded. They enter the arguments as a way to evaluate the translation of inputs—nursing hours, to benefits—nursing service.

The normative roles usually assigned to the various decision makers in the hospital suggest how the bargainers might behave. The clinical professions—primarily nurses in this case—will bargain for the purchase of additional nursing services. They will attempt to argue that the utility of another nursing service exceeds its cost and exceeds the value of any other good or service available. Their arguments will center on quality and on the desirability of identifiable elements of service that will be foregone if their demands are not met. The administrator and the trustees will bargain to protect the patient's purse, arguing that he needs the money or that there are other goods or services that have a higher utility. If these stereotypes apply and there is "hard bargaining" or a considerable impact of administrative and cost factors, there will be certain predictable results.

First, within the same labor market, under the same set of third party arrangements, and for similar groups of patients, similar groups of bargainers would tend to have the same number of hours per patient day. Second, there would be considerable pressure to identify and install the least-cost organizational parameters. All those that cost less than the value of the nursing time they release would be installed because this is to the

Figure 1.—Marginal utility of nursing care.



advantage of both parties. Again, one would expect consensus to develop among hospitals in similar situations. Third, given that nursing care is a high priced and scarce resource, considerable attention would be given to controlling the actual delivery of nursing care so that it would not deviate from the level agreed on as appropriate.

There are some special cases of this analysis that must be discussed briefly. One is the case where the supply of nurses is consistently less than the demand at the prevailing wages. As has been indicated by Yett (*12*), this situation would be characterized by steadily rising hospital nurse wages at a rate faster than the rise of wages in other nurse employment or other similar employment opportunities. It also would be characterized by an even greater pressure to seek nurse saving changes in the organizational parameters.

The more interesting case is where there is no utility consensus as a result of the bargaining process. One possibility is that there is no "hard bargaining" or that the bargainers perceive the marginal utility of additional nurses as being more difficult to estimate than the impact it will have on the outcome. Under this situation, the decision as to the amount of nurse staffing may be treated as unimportant and the amount of nurse staffing would tend to be reduced slowly to the point where a strong consensus could be reached on the undesirable impact of reducing it further.

The second case of lack of consensus would be where the utility is perceived very differently by different parties to the bargaining. Under this case the solution would reflect the most powerful bargaining group. One might expect actual solutions to be subject to sharp variations depending on which group is in control. The situation would probably be accompanied by considerable tension and dissatisfaction. These two cases of lack of consensus can be compared to a ship. In the first case, no one is interested in where the ship is going and it is allowed to drift. In the second case, the ship sails smartly in a variety of directions depending on who is at the wheel.

It is of some interest to consider what happens to the engineering approach under these economic cases. Where there is consensus there will be considerable interest in the engineering approach to the extent that it rationalizes the agreed upon decision and is useful in finding least-cost organizational parameters. Otherwise it will be ignored. It also will be ignored in both cases where there is no strong consensus. Where the ship is drifting aimlessly, no one will wish to invest the money necessary to evaluate various nursing activities. Where there is a continual struggle for the helm, all energies will go towards the battle.

The Current Performance

The implications of the engineering approach taken alone and of the economic approach in the analysis of the evidence with regard to nurse staffing are quite different. The engineering approach would imply that hospitals that have a given set of organizational parameters and that treat patients of similar average severity of illness should have the same quantities of nursing care. The economic approach would suggest that factors quite outside the organization itself, such as the extent and kind of third party coverage and the wages of nurses relative to other health care resources, would also affect the amount of nurse staffing.

Also, the economic approach provides additional explanatory power. It suggests that if the variation in nurse staffing between hospitals that are similar in these characteristics is large, then either the bargainers do not care about the results or they cannot reach a stable agreement. Neither one of these findings would be socially useful. It is incongruous to say that no one cares about the most expensive single resource that the hospital purchases. Neither is it a hopeful sign to contemplate continued tension and abrupt changes in the quantity of nursing resource.

Actual Nurse Staffing

Unfortunately, the definitive research suggested here does not appear to have been done. There are a number of empirical problems that make one hesitate to attack such research. Such evidence as we do have is far from encouraging. One finds, for example, that the number of nurses employed in hospitals by the State bears little relation to the bed supply of those States (refer to table 1). Not only do the States range from 171 nurses per 1,000 beds to 436 nurses per 1,000 beds, a difference of over 150 percent, but adjacent States vary by 10 percent or more.

For example, see New Jersey at 300 nurses per 1,000 beds and New York, Pennsylvania, and Delaware, or Massachusetts, Rhode Island, and Connecticut. The widest of these variations is between Arizona, the second highest State, and New Mexico –424 and 264 RN's per 100 beds. There also is no pattern between economically similar States. Michigan is 20 percent lower than Illinois, for example. The causes are likely to lie in licensure examination levels, acceptance of reciprocity, and the presence of schools of nursing. But these are items that over long periods of time are within the control of the bargainers.

Data compiled by Hospital Administrative Services (HAS) on the number of nurse hours per patient day similarly show an extraordinary variation. HAS segregated hospitals by State, district, function, and size, thus making at least crude approximations for many of the explanatory variables. These data, shown in table 2, are quite recent but include only 200 self-selected hospitals. The

Table 1.–Location of RN's employed in hospitals in relation to hospital beds: 1968

Location	RN's	RN's per 1,000 hospital beds
United States	445,243	268
New England		
Connecticut	8,179	336
Maine	2,498	257
Massachusetts	20,007	313
New Hampshire	2,142	319
Rhode Island	2,527	289
Vermont	1,361	289
Middle Atlantic		
New Jersey	15,715	300
New York	49,290	239
Pennsylvania	33,392	287
South Atlantic		
Delaware	1,242	248
District of Columbia	3,610	236
Florida	13,079	294
Georgia	6,877	202
Maryland	8,172	245
North Carolina	8,642	243
South Carolina	3,876	206
Virginia	8,707	226
West Virginia	4,037	252
East South Central		
Alabama	4,986	175
Kentucky	5,104	222
Mississippi	2,837	171
Tennessee	6,051	183
West South Central		
Arkansas	2,340	211
Louisiana	4,978	186
Oklahoma	3,741	225
Texas	16,338	218
East North Central		
Illinois	27,653	269
Indiana	9,432	242
Michigan	16,338	229
Ohio	22,894	281
Wisconsin	10,357	275
West North Central		
Iowa	7,284	353
Kansas	5,129	258
Minnesota	11,668	349
Missouri	8,594	221
Nebraska	4,204	323
North Dakota	1,832	294
South Dakota	1,711	267
Mountain		
Arizona	3,936	424
Colorado	6,084	367
Idaho	1,391	352
Montana	1,960	425
Nevada	896	322
New Mexico	1,580	264
Utah	1,933	384
Wyoming	796	197
Pacific		
Alaska	713	357
California	44,137	330
Hawaii	1,775	284
Oregon	5,032	333
Washington	8,186	436

SOURCE: *Nursing Personnel in Hospitals, 1968.* U.S. Department of Health, Education, and Welfare, Public Health Service, National Institutes of Health, Washington: U.S. Government Printing Office, 1970.

Table 2.—Median nursing hours per adult medical surgical patient day, HAS subscriber hospitals, 6 months ending 12/31/71

Region	Bed size							
	Under 50	50–74	75–99	100–149	150–199	200–299	300–399	Over 400
New England	8.04	7.07	6.90	6.71	6.56	6.23	6.40	6.46
Middle Atlantic	8.22	6.24	5.91	5.53	5.84	5.60	5.72	5.54
South Atlantic	7.27	6.41	6.80	6.26	6.09	6.12	6.47	6.04
East South Central	6.39	6.60	6.31	6.46	5.98	6.03	5.93	5.82
West South Central	6.62	6.65	7.49	6.80	6.25	6.08	5.42	5.36
East North Central	6.65	6.72	6.73	6.49	6.74	6.48	6.33	5.98
West North Central	7.05	6.88	6.87	6.71	6.93	6.32	6.28	6.51
Mountain	6.78	6.73	6.47	6.84	7.81	6.95	6.53	7.01
Pacific	7.51	7.83	6.92	7.07	6.87	7.14	6.50	7.10

SOURCE: Six-Month National Comparison, Hospital Administrative Services, (HAS) The American Hospital Association, Chicago.

patient care on medical-surgical units, not simply for registered nurses.

Table 2 shows the size adjusted regional medians. The following chart summarizes the variation within size group:

Size	High Region		Low Region	
Under 50 beds	Mid Atlantic	8.22	E.N. Central	6.39
50–74 beds	Pacific	7.83	Mid Atlantic	6.24
75–99 beds	E.S. Central	7.49	Mid Atlantic	5.91
100–149 beds	Pacific	7.07	Mid Atlantic	5.53
150–199 beds	Mountain	7.81	Mid Atlantic	5.84
200–299 beds	Pacific	7.14	Mid Atlantic	5.60
300–399 beds	Mountain	6.53	E.S. Central	5.42
400 and over	Pacific	7.10	E.S. Central	5.36

The data show some pattern. The Pacific region tends to be high and Mid-Atlantic low. But both regions are reasonably well supplied with registered nurses, according to the older data on table 1, and the Mid-Atlantic States have the peculiarity of being high for small hospitals and at or near the low for all other sizes. Further, one would infer from these data a demand for more nursing personnel for very small hospitals, fewer for hospitals up to 150 beds, and fewest for large hospitals either 300–400 beds or over 400 (see figure 2). There may be explanations for this. The analysis of returns to scale at varying levels of service by Carr and Feldstein is suggested by the shape of the cost curves (*13*). Problems of reporting and nonrepresentative samples cannot be ignored.

The ranges of behavior for all hospitals in the size groups is shown in table 3. One is forced to conclude from these data that size matters very little, at least at the low end of the scale. All the fifth percentile values are within 10 percent of the lowest hospital, which is an over-400 bed, non teaching hospital with 4.4 hours per adult medical surgical patient day. The variation increases substantially for the 95th percentile, where the low value is 7.45 and the high is one-third more, 10.02. The ranges within size groups, however, cover increases of 80 to 150 percent.

The conclusion the author draws from these data is that there is no consensus on the question of nursing utility. The recurring wide variations and the apparent failure of known theory to explain the cause suggest that nurse staffing is simply not subject to administrative and cost factors. Undoubtedly, more careful research would reveal considerable impact from organizational

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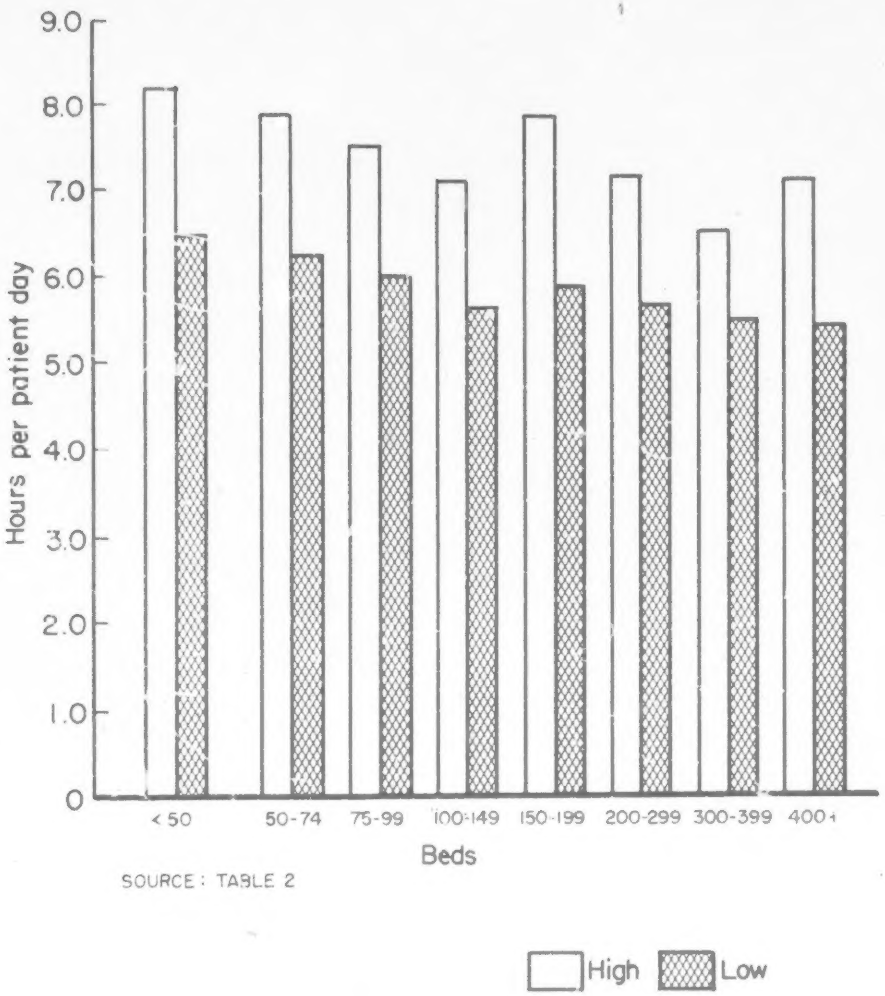
Figure 2.—High and low region medium AM&S nursing hours per patient day.



SOURCE: TABLE 2

Table 3.—Percentiles of nursing hours per medical surgical patient days in HAS subscriber hospitals, 3 months ending 10/31/71

Bed size	5th percentile	1st quartile	Median	3rd quartile	95th percentile
Under 50	4.68	5.92	6.88	8.02	10.02
50–74	4.87	6.04	6.79	7.51	9.52
75–99	4.82	5.97	6.59	7.29	9.13
100–149	4.84	5.79	6.47	7.22	8.63
150–199	4.58	5.54	6.31	6.94	8.09
200–299	4.76	5.51	6.04	6.82	8.18
300–399	4.61	5.55	6.11	6.70	7.93
Over 400	4.40	5.22	5.74	6.38	7.45
Teaching	4.53	5.67	6.36	7.23	8.98

SOURCE: Hospital Administrative Services (HAS), prepared on request of author.

parameters and environmental factors, but still, substantial random or unexplained variance is likely to remain.

One study that relates to this question yields essentially this finding. Ingbar, Whitney, and Taylor performed multivariate analyses on nursing hours per patient day in 72 Massachusetts community hospitals using 1958 and 1959 data (*14*). At that time, five factors measuring the type and scope of services explained 34 percent of the variance. Surgical activity was the largest, explaining 22 percent. A measure of ambulatory activity (X-rays) explained 6 percent. Measures of ward patients and educational activities explained the balance. The use of nursing students explained an additional 20 percent of the overall variance. Forty-six percent of the variance remained unexplained. This rather large residual is not suggestive of clear consensus.

Control Technology

Although available data on actual nurse staffing and distribution of nurses reveal substantial variations in actual performance, it appears that at least crude technologies are available that could permit more careful control of this resource. Progressive patient care concepts of grouping patients according to the severity and kind of need have been around for many years, and at least the intensive type care units have proved popular. These help in controlling severity-of-illness variance and establishing appropriate care, but they do not eliminate the staffing problem (*15*). Manual methods for maintenance of control of nurse staffing have also been available and have been demonstrated to be feasible. Computer aided scheduling systems have also been developed and at least one of these has been marketed commercially (*16*).

Both manual and computer scheduling systems rely upon the use of "float pools" or reassignment of nurses to maintain desired levels of staffing. They have an additional advantage in that they incorporate measures of their own success. Thus, where these models have been put into effect, it is possible not only to strike a bargain regarding the appropriate amount of nurse care but also to monitor how closely it has been achieved. Even manual systems are susceptible to a variety of kinds of monitoring, either of total hours delivered or of hours per patient day delivered. The HAS system cited above provides routine data on this question together with standards of comparison for individual hospitals.[1] So do several regional systems of manpower planning and control such as CASH (*10,17*).

It seems reasonable to conclude that the technology for monitoring and controlling nurse staffing is feasible. There is no evidence, however, that it is widely applied—say in as many as 20 percent of U.S. community hospitals. Without extensive surveys it is difficult to make this conclusion definitively. Yet the existence of continued variation in the very measures that would be used for control is strongly suggestive of a lack of what one would call a closely bargained outcome.

The same argument may be extended to the various organizational parameters. Other than intensive care units and coronary care units, these have not even received enough attention to be properly validated. Often, in fact, the goals of installing these systems, such as Service Unit Management System, appear to be different from a goal of freeing nursing resources *(18)*. Thus changes in organizational parameters have only infrequently reached the level of consensus in the bargaining process, and when they have, the reasons have sometimes been tangential to the direct problem of nurse staffing.

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[1] HAS, The American Hospital Association, Chicago, Illinois.

The evidence, unfortunately, is circumstantial and unsatisfactory, but on a number of fronts it tends to the conclusion that the trustees, administrators, directors, and nurses who are central to the bargaining process do not appear to have acted in a manner that either an economic or an engineering approach would dictate. To return to the sailing analogy, the ship is adrift. The administrative and cost factors of nurse staffing have not had any perceptible impact. It might be desirable to explore some of the assumptions and implications of the model in order to identify potential reasons that this is so.

Difficulties in the Control of Nurse Staffing

If we postulate economically rational bargainers working within the framework of feasible technology, there seems to be an identifiable set of potential and actual difficulties. Empirical specification of these is again difficult, partially because the documentation of why things do not work in the health field is quite limited *(19)*. Such difficulties as are known, however, can be classified as conceptual, technical, and professional.

Conceptual Difficulties

Conceptual difficulties obscure the bargaining process and impede the solution because confusion exists in the bargainers's mind as to what the bargaining issues are. The most serious conceptual difficulty in nursing appears to be the lack of clear definitions of nursing roles and the lack of measures of quality of nursing activity. Quality, of course, is closely related to utility. Although there are some problems in assuming that they are synonymous, the measurement of quality clearly sharpens the understanding of utility. Concepts and methods of measurement of quality need to be much more clearly developed.

In medical (that is, physician) care, it is possible to identify structural, procedural, and outcomes measures of care. Although structural measures turn out to be of limited use and outcomes measures are incomplete procedural measures exist in considerable detail, at least for the inpatient hospital portion *(20)*. Whole systems of management and analysis, such as the Professional Activities Study (PAS), exist and are routinely used *(21)*. Research in medicine tends to validate the procedures against outcomes. A body of validated procedures exists as a result of the decades of intense effort.

Some efforts are underway at Michigan to develop procedural and outcomes measures of nursing performance in a manner analogous to PAS.[2] In this approach, the activities and the outcomes that clinical nursing judgment suggests are desirable can be specified for patients classified according to their diagnoses. Some desirable activities would be common to every patient. The list of quality indicators compiled by CASH and developed and used by others is an example *(22)*. Other activities would be quite specific to the diagnoses, as the attached prototype for diabetic patients suggests (see figure 3).

Preliminary work on this approach is already underway.[2] The specification of disease related items of care that can be reliably assessed by an independent observer appears feasible. Work this summer will investigate whether economically practical surveys will yield sensitive and reliable assessments. The effort is still some years from the point of universal day-to-day use. It will be a costly instrument until it can be reduced to a limited number of representative indicators. More important, it appears that nursing staffs will require considerable reeducation to orient themselves to this form of purposive professional behavior.

The effort is consistent with the philosophy of

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[2] Smith, R. L. and Horn, B. J., personal communication.

Figure 3.—Prototype outcomes quality assessment instrument, patient observation section, diabetes mellitus.

Patient Observations

1. Have you been giving your own insulin? YES____ NO____
   (a) (If YES) When did you begin? ____________
   (b) (If YES) How competent do you feel? VERY____ SOMEWHAT____ NOT AT ALL____
   (c) (If SOMEWHAT or NOT AT ALL) Why? ____________
   (d) What material and aids do you have? ____________
2. Have you been selecting your own diet? YES____ NO____
   (a) (If YES) When did you begin? ____________
   (b) (If YES) How competent do you feel? VERY____ SOMEWHAT____ NOT AT ALL____
   (c) (If SOMEWHAT or NOT AT ALL) Why? ____________
   (d) What material and aids do you have? ____________
3. Have your been doing your own urine testing? YES____ NO____
   (a) (If YES) When did you begin? ____________
   (b) (If YES) How competent do you feel? VERY____ SOMEWHAT____ NOT AT ALL____
   (c) (If SOMEWHAT or NOT AT ALL) Why? ____________
   (d) What material and aids do you have? ____________
4. Injection observation
   (a) What insulin did the doctor tell you to take?
   Type________ Strength________ Units________ Freq________
   (b) What unit syringe do you have or plan to buy? 40____ 80____ 40/80____
   (c) Observation of patient's self-injection:
   Touch needle YES____ NO____
   Clean vial top YES____ NO____
   Insert air in vial YES____ NO____
   Correct dosage YES____ NO____ If NO, specify____________
   Cleanse site YES____ NO____ If NO, specify____________
   Injection: into subcutaneous tissue YES____ NO____
   If NO, adipose YES____
   intramuscular YES____
   Post injection: Gently wipe site with sponge YES____ NO____
   Comments ____________
   (d) Observed condition of injection site:
   Hardness YES____ NO____
   Inflamed YES____ NO____
   Bruised YES____ NO____
   Comments ____________
5. Urine testing
   (a) What tests has your doctor asked you to use? Clinitest________ Acetest________
   Freq ____________ Dyestick________ Ketostix________
   Timing of testing____________ Tes-Tape________
   (b) Describe procedure you will be doing:
   Empty bladder YES____ NO____

Figure 3. (con.)

Drink water YES____ NO____
Void and test YES____ NO____

(c) Test time with respect to meal time:
Prior (minutes)____________ Skipped (   )____________

(d) Observation of patient's self-urinalysis:
Sugar test CORRECT READING____ INCORRECT READING____
Acetone test CORRECT READING____ INCORRECT READING____
Comments ____
____

6. Diet knowledge

(a) What are your doctor's orders concerning your own diet?
Calories____ CHO____ Protein____ Fats____
Comments ____
____

(b) Observation of patient's menu selection (see attached copy of menu)
Correct calories: CHO YES____ NO____
Protein YES____ NO____
Fats YES____ NO____
Comments ____
____

(c) What materials do you have pertaining to your diet to assist you with diet selection?
Exchange list________ Diet selection sheet________ General food discussions________
Diet record form________ Exchange instructions________ Other________

7. Foot care observation

(a) Cleanliness ADEQUATE________ NOT ADEQUATE________
(b) Toenails (cut) STRAIGHT________ CURVED________ LONG________
(c) Dryness NONE________ SOME________ SEVERE________
(If SOME or SEVERE) Is this condition the SAME____ WORSE____ BETTER____ than a few days ago?
Desquamation NONE____ SOME____ SEVERE____
Daily use of lubricants YES____ NO____
(d) Calluses NONE____ SOME____ SEVERE____
(If SOME or SEVERE) Are they the SAME____ WORSE____ BETTER____ than a few days ago?
(If SOME or SEVERE) What are you doing about it? ____
____

8. Foot care information

For each of the following, is it or is it not recommended for your feet?

Wearing wool socks
Wearing loafers
Wearing elastic garters
Hot water bottle
Metal arch supports
Walking barefoot
Wearing sneakers
Foot powder

SOURCE: R. L. Smith and B. J. Horn, The University of Michigan, Bureau of Hospital Administration. (This figure is a draft and should not be reproduced.)

clinical nurse specialization, however, and it should be useful soon in at least research or nonrepetitive applications. In the meantime, most of the existing quality measures, such as large part of the CASH instrument, have been found to be lacking in reliability or sensitivity or validity.[3] In the absence of workable quality measurement systems, debate on nurse staffing takes the character of speculation, and a consensus from the bargaining process becomes much less likely.

Also, there is a semitechnical, semiconceptual difficulty in nurse staffing as to the meaning of the average number of hours per patient day deemed appropriate for a group of patients of given illness severity in a given set of organizational parameters. In an uncontrolled situation there is considerable daily variance in the amount of nursing care required on a given ward. This is traceable to both illness severity and census variation and introduces the possibility of a significant ambiguity. The appropriate level may be perceived as that level which on the average is within the working performance of a given set of personnel; that is, the level that can be sustained by a work group under varying conditions over a reasonably long period of time.

Alternatively, the appropriate level may be perceived as that amount necessary for the individual patients on a given day. The average of the latter is likely to be smaller because it does not include allowance for occupancy variation. If it were the chosen level, the variation would have to be controlled or there would be substantial quality decline and an increase in complaints from people who are responsible for giving care. The conceptual difficulty is that in many people's minds the two problems have never been separated. If one asks a director of nurses what staffing levels she thinks are required by her patients one cannot accept the answer at face value. It may contain allowances for occupancy fluctuation.

Technical Difficulties

While feasible technology for nurse staffing exists, it is far from perfect. There are two or possibly three problems that the technology attacks, but there are residual difficulties in each area. The first task is for the hospital to arrange a predictable supply of nurses and other nursing personnel for each day and shift and to set that level somewhere near the point where an appropriate quantity of service can be delivered. This is the scheduling problem that arranges days on, days off, and shift assignments for each individual employee, subject to wage and hour legislation, union contracts, absenteeism, and desired number of personnel reporting. The most commonly reported solutions have been cyclic schedules that claim to permit the nursing department to make individual work plans in a relatively economical manner (*23*).

The major difficulty with these appears to be in the variability of human needs. Sometimes these are expressed in the form of a request for exceptions from agreed upon schedules. Other times they appear simply as absenteeism. The result is that the schedule seems always to be in transition and it never reaches a steady state. The Management Monitoring Systems Demonstration (*24*) going on at Michigan indicates that for one demonstration hospital nursing department this problem is central and disabling. It is simply not possible to predict the quantity of nurse manpower that will appear on any given day, even though considerable effort is expended by the nursing supervisory personnel.

Warner of the Michigan group is working on a new approach to the scheduling problem that will make an optimal assignment by mathematical programing methods based upon nursing personnel's own preferences as to work times (*25,26*). This may reduce some of the inherent causes of dissatisfaction with long range schedules, as well as drastically reduce the amount of middle management time involved.

The second technical problem can be described as an assignment problem. Given that a known or closely predicted number of nursing personnel are available for distribution to a described inpatient census, one must assign them to nursing units in a way that maximizes the overall utility subject to certain constraints. This problem has received considerable prior attention. As was noted above, feasible models for its solution exist, both in a manual and in a computer oriented mode.

The manual modes appear to be uneconomical. They make large requirements on personnel and require considerable dexterity of the operator. In the McPherson Community Health Center, for example, the director of nurses handled the assignment problems quite well. Her assistant, who was forced to do it 2 days a week, had extreme difficulty, as evidenced by less desirable solutions and much greater expenditures of time and effort.

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[3] Smith, R. L., unpublished paper.

A semiautomated solution, which uses the computer to suggest an apparently optimal solution for review by the responsible nursing supervisor, appears to be the method of choice. One of the most important technical difficulties in this approach from the administrative and cost viewpoint is the specification of the objective function. This is the element that will determine the relative utility of various possible assignments and select the one that makes the greatest contribution.

There are a number of possibilities. One that the Michigan group is attempting to explore would attempt to use the floor supervisor's own preferences for additional staff. While this evaluation is too subjective to provide much improvement over present practice directly, if certain more objective predictors of that evaluation can be determined, such as a Connor type severity of illness scale *(17)*, the objective measures can be used as a proxy utility function for day-to-day assignments.[4]

Even if the Michigan approach provides an improvement in the assignment technology, another portion of the objective function remains for systematic exploration. The assignment model assumes that at least some fraction of the nursing personnel are available for assignment on any two or more nursing floors or units. It is well known that there are some costs involved in transfers or reassignments. These costs appear to include attitudinal costs on the part of the employees, training cost necessary to orient personnel for two or more work assignments, and quality costs involved in the lack of knowledge of patients for a recently transferred person.

These costs can be minimized by reducing the variation in number of patients and severity of illness, which will have the result of reducing the number of transfers required. Thus, stabilizing the occupancy level of the floor and utilizing different floors for different purposes in the progressive patient care manner seem to be desirable. If a situation existed where occupancy were reasonably stable, patients were assigned to patient units according to their severity, a scheduling system resulted in predictable numbers of nursing personnel reporting each day and quality evaluation schemes were available, it would become possible to evaluate the tradeoffs between transfers and appropriate staffing. The result of this evaluation might be that fixed staffing for floors of stabilized census and illness severity is the cheapest possibility. In this case, the assignment model would be unnecessary.

It is difficult to evaluate the severity of the technological difficulties. To be sure there are opportunities for improving the technical models, but the nature of the technology is such that this is likely always to be the case. In the meantime there is little evidence to support a conclusion that the presently available models would not contribute to the control of nurse staffing.

Professional Difficulties

Day to day work on the Management Monitoring Systems Demonstration with two community hospitals in Michigan leads the investigation team to identify a problem concerning the ability and understanding of nursing supervision that is too serious to leave unnoticed. The conceptual and technical issues involved in the problem of nurse staffing are obviously not simple. It has been rare for the project staff to encounter any significant insight into these problems by nursing supervision in our demonstration hospitals.

Of course one would not expect expertise in economics, work measurement, mathematical programing, or sociological analyses of decision making in hospitals. On the other hand one might expect at least intuitive comprehension that there probably is an appropriate level of care for each individual patient, that the consumer or his agents have a reasonable interest in the definition of what is appropriate, and that individual variations tend to average out when patients are taken as groups.

In each of these situations we have encountered what appears to be an absence of understanding. In both of our demonstrations there has been serious question raised by both research staff and administrative staff as to the capability of nursing supervision to deal effectively with improved control of staffing. At the very least it appears necessary either to begin rather extensive and fundamental retraining or to supplement the nursing supervisory structure with managers with a different form of training. It is impossible to tell how widespread this problem is, but there is nothing to justify optimism.

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[4] Trivedi, V., doctoral dissertation, in progress.

Validity of the Economic Bargaining Model

The implementation of the engineering model alone is that carefully developed measurement techniques would yield consistent values for a given severity of illness, and these would be adapted smoothly and uniformly by the hospitals across the United States. The only cause of residual variation after a reasonable period of time would be variations in severity of illness. Since individual hospitals each admit several thousand patients each year and make their admissions under at least roughly comparable systems, differences in the average severity of illness would tend to be quite small as would the differences in staffing patterns. This obviously is not consistent with the facts.

The economic bargaining model brings several additional possible explanations into play, but one would expect it to lead to uniformity, at least among economically similar situations. Although evidence for this is not fully explored, the outlook is distinctly unpromising. Short of abandoning the economic bargaining model (a step not to be taken lightly), the most reasonable conclusion is that hospitals are operating in the special case where no utility consensus results from the bargaining process. More specifically, the bargaining parties perceive the marginal utility of nurses as very indeterminant or difficult to estimate.

Thus they have allowed nurse staffing to wander in an essentially uncontrolled manner. The reasons for this appear to lie in the conceptual difficulties, particularly the lack of any objective measurement of utility and in the technical and professional problems. If, however, either party in the bargaining process had strong convictions, a consensus would develop around those convictions. No such movement is perceptible. Neither nurses nor doctors, for example, have come forward with demands as to the required quantity of nurse staffing,[5] and hospital administrators and trustees apparently have not resisted any of the numerous solutions that seem to be reflected in the variety of current practices.

The problem presented by this conclusion is that there seems to be conflict with the normative values about the appropriate roles of the bargaining parties. One assumes that trustees and administrators should be concerned with costs, that doctors and nurses should be concerned with quality, and that the four of them will bargain in a more or less effective manner. This may be where the problem lies in the control of nurse staffing. In fact, trustees evidence little interest in the control of hospital costs, often do not have the proper information necessary to show interest in costs (*27*), and certainly cannot be described as having been effective in the control of costs.

The nature of the prevailing cost reimbursement contracts and the sharing of costs through third party coverage provides little direct incentive for cost control. The record of continuing inflation speaks for itself. So, unfortunately, do the planning decisions of hospital trustees. There has been no tendency toward improved occupancy of American hospitals, little activity toward mergers, and frequently documented cases of almost deliberate competition and over expansion of hospital facilities. These decisions are very largely within the realm of trustee authority. They imply that, at least up until the very recent months, control of costs has not been a primary activity of hospital trustees.

A less important factor in the attitude of the bargaining parties may have been the prevailing belief about the existence of a "nursing shortage." If all the parties approached the bargaining table with the attitude that no matter what solution is reached for nurse staffing it is inadequate, no serious bargaining will result. Not much has been heard lately about the nursing shortage. Both of the demonstration hospitals have established guidelines as to the appropriate average nursing hours per patient day and both appear to be expecting their nursing department to stay at or below the guideline. Other hospital administrators in southeast Michigan have also commented that they no longer have chronic vacancies in nursing. There is no way of knowing whether this is also true in other States.

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[5] "The American Nurses' Association does not recommend any specific formula, ratio, or numerical concept which could be applied generally. . . ." American Nurses' Association, Committee on Nursing Services, "Statement on Nurse Staff Requirements for Inpatient Health Care Services." The Association: New York, March 1, 1967.

Some Speculations on the Future

If the model and the facts are not misleading, one can infer that the question of nurse staffing has been a nonissue in most community hospitals. The author is not willing to predict that this will change. Although there has been a great deal of public "viewing with alarm" of hospital costs, there has been relatively little serious activity aimed at their control. One must look to the political arena for firm signs of such action. The evidence is mixed at the Federal level and, on the balance, negative at the State level.

Federal action, for example, could have effectively forced national franchising; it could have moved more strongly against the economic position of pathologists and radiologists; it could have passed the so-called Bennett Amendment for professional peer review or even something stronger than the Bennett Amendment; and it could have moved much more strongly towards prospective rating for Medicare payments and uniform national payment schemes for Medicaid. As of this writing none of these things have come about. The clearest sign has been the 6 percent limit on price increases imposed by the Price Commission. Even there, there is a provision for exceptions. It will be several months before it is clear how firm that guideline is to be. The permanence of the Commission is also a question.

At the State level, it would appear that a small minority of States feel the cost of hospital care to be a central political issue. After some years experience in New York with the Metcalf-McCloskey Act, franchising or certification of need of hospital expansion has been successfully introduced in only a handful of other States. Insurance commissioners who might insist on more control of costs through third party payment mechanisms have generally not done so. Dennenberg of Pennsylvania and a few others have attracted publicity partially because they are the exception rather than the rule. Steps toward public utility type regulation of hospitals have been minimal. Only California, for example, requires that hospitals publish information about their rates and costs.

One occasionally encounters activity at the State level that appears to be in the exactly opposite direction. A bill was introduced in the Michigan legislature in 1971 that would have effectively removed all control of either costs, quality, or utilization from Blue Cross in Michigan.[6] In one version it specified that Michigan Blue Cross was obligated to pay audited costs of any licensed hospital. The bill was eventually passed in a less drastic form at the same time as a bill to provide franchising or certification of need legislation. Fortunately, the latter act restores many consumer protections the former destroys.

The trend overall seems in the direction of increased control of costs. It is easy to predict the result from the economic bargaining model if this trend solidifies. Increases in nurse staffing will be strongly resisted and hospitals will begin to notice the range of behavior within their own regions. This will lead administrators and trustees to raise questions about the staffing levels in all hospitals except those at the bottom of the range.

To the extent this occurs, it looks as though nurses will be unprepared. In the absence of a quality measure they will be forced to rely upon arguments based upon the subjective assessments of utility and the existence of the "nursing shortage." The evidence of the range of current performance will be used against them in the subjective quality arguments. They may do better with the arguments about the nursing shortage, but it is likely that people will begin to say that if the shortage has existed for all these many years, perhaps it isn't as bad as we initially thought it was.

In any case, a move toward tighter cost control will result in considerable pressure to install and improve the technology. Thus interest in the models for nurse scheduling and nurse assignment will continue and probably increase. So will interest in the evaluation of the organizational parameters, including the appropriate roles for various skill levels, supervisory structures and service unit management, and related proposals. The evaluation of all these, both organizational parameters and technological schemes, will depend on better quality instruments as will the defense of present or increased levels of nurse staffing.

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[6] H. B. 4030, Michigan Legislature, 1971.

The conclusion seems to be that although the impact of administrative and cost factors on nurse staffing is at the moment relatively insignificant, there is quite a powerful chain reaction that might occur if there is a basic change in the attitude of the American people toward the cost of hospital care. Given attention to this it is inevitable that there will be attention to nurse staffing, if for no other reason than that it is the largest single component of hospital costs. The resulting attention will lead to calls for improved technology, better defense of present practices, and evaluation of proposals for improved organizational parameters.

In each of these areas the central item becomes the development of measures of quality of actual nursing performance. Advances on this front will clarify nursing roles, aid in the evaluation of organizational parameters, permit the improvement of scheduling technology, and improve the knowledge of all parties to the bargaining processes. In the author's opinion it is the most critical of the various opportunities and is worth substantial Federal support. A 5-year multidisciplinary and multiuniversity effort measured in millions of dollars each year would be entirely appropriate to national health care needs.

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DISCUSSION OF MR. GRIFFITH'S PAPER

Discussion Leaders

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Miss Martin

I think Mr. Griffith has left us with the impression that nurses spend the bulk of their time worrying about how much they are going to be paid in relation to all the people working under them, and that we really care little about overall costs. I would have to disagree with him. We are very concerned about costs. As a group we do not spend any more time on these kinds of concerns, about what others are going to be paid in the nursing hierarchy, than administrators spend discussing the administrator hierarchy salaries. This is not something about which nursing alone expresses concern.

Dr. Aydelotte mentioned a void in the literature she has reviewed that deals with the administrative and cost factors in nurse staffing. Traditionally there has been a void regarding this in the education of professionals, both nurses and doctors. The emphasis, of course, has been on educating the professional person in the clinical practice of nursing or medicine, and more attention needs to be given to the financial aspects of health care in programs of formal preparation. Perhaps Muriel Poulin would like to talk about this as far as her program of nursing administration at Boston University is concerned.

In the HAS program, the American Hospital Association designed the format for the figures that are reported there. These figures represent the manhours paid for all those assigned to a nursing unit without any thought as to what they are doing. As I understand from our personnel department, these are actual hours worked or paid for without any thought of who the people are or what they do as long as they are assigned to a nursing unit. This can be a very misleading figure, and we ought to take that into consideration. All hospitals do not necessarily assign personnel to cost centers using the same rationale.

I agree with Mr. Griffith when he says we need to begin—I would say continue—an extensive and fundamental retraining of our nursing supervisory people. There are many instances where this is being done and being done very well. If you look at how people have been assigned to supervisory positions in hospitals traditionally, you will find they have been chosen because they have been there the longest and not because they have had any particular preparation to assume this responsibility. If you look at the majority of hospitals in our country, those around the 100-bed size, this is still the way these people are being chosen. We need to provide opportunity for these people to learn to function as managers of nursing rather than to criticize them for not functioning in this role.

In his paper Mr. Griffith does not suggest that we do this or that we provide managers with a different form of background and training. We are only muddying the water, and we have had quite a lot of this with all the people added to the structures within the hospitals. I see it even with the Unit Manager System in some instances. Instead of relieving nurses of duties, it adds time to their workload in some other way. Communication becomes more difficult when there are more people with whom one must communicate to get the job done. I am sure there are many nurses in the room who will want to speak on this later.

Dr. Sloan

I was glad to see that we are discussing papers on implementation at this conference. Yesterday we discussed the very important problems of what should be done or how you could start from scratch to staff a hospital. The problem is that one can devise many schemes on paper, but things may not work that way, which brings us to the question of implementation.

We face parallels elsewhere in the health sector. For instance there has been much talk about HMO's and how desirable they are, but they will not be successful if producers and consumers don't like them. In other words, one may design something very nice and find out it is not desirable for less "objective" or "quantifiable" reasons.

I was also glad to see that you made the following considerations explicit, even though many if not most of us are generally aware of these matters. The first pertains to substitutions. There are substitutions of various types of nursing personnel that we might want to consider. We have RN's but we also have other categories. We have capital that may be in some limited sense substituted for labor. We actually discussed that very briefly yesterday.

Second, with respect to staffing ratio, higher ratios of nurses to patients yield (holding other factors constant) a product that is of greater value to patients. If one increases the ratio one gets more, but there is a question of how much more one can get. There is no particular ratio of nursing per hour or nursing hours per patient that is appropriate. Rather, there are a number of these numbers, and the question is, What are they worth? This was adequately discussed in the formal presentation.

This, of course, gets into the question of assessment of what a nurse is producing. The same issue is found in the area of education planning where evaluators attempt to gauge effectiveness. In education there are different success criteria; there are numerous different instruments. Results differ in large part because instruments differ. I certainly would not like to see this kind of research conducted at the cost of understanding how hospitals actually behave, especially with regard to how they select and use inputs for the production of care.

The third point concerns the discussion in the paper of different types of staffing models. There is an assessment of whether hospitals really behave as if they were implementing this engineering model, and this notion is rejected. Likewise there is a consideration of an economic model where in some sense some administrator or trustee evaluates the utility of the service and weighs this against the cost of providing that service.

I would argue with the author about both of these models. I think he rejected them too quickly. He takes an unduly pessimistic stance, and I shall discuss that in a moment.

There is the point that the third party payer has to be considered, the point that most hospital reimbursement (or at least a considerable percentage) is cost-plus, and as long as you have cost-plus reimbursement there is no incentive on the part of trustee or administrator to look at cost considerations. There is a very widespread use of cost-plus in the hospital industry, and, of course, it is not the only industry that uses it. Aerospace is a good example; biomedical research is another. But hospitals are one example in which some behavior that we observe reflects very much the fact that we do have cost-plus reimbursement arrangements. And when we look at how staffing takes place we should remember that we do have to take that into account. Reimbursement is not something to leave to the economists and staffing to the sociologists and radial units to the architects. We must work together.

This paper has stated that we do have to worry about implementation, that there are some patterns in staffing that are not explained. I think we have to develop formal models a bit more, ones that are testable with data. The problem in any kind of empirical work is that if you build an inaccurate model or you do not build a complete model, you always end up accepting the null hypothesis. Here the null hypothesis is that hospitals do not behave in a systematic way with respect to staffing. If you do not build a complete model, you are always going to have to accept that hypothesis. It is not an easy hypothesis to accept.

The author does cite some work by Ingbar and Taylor that seems to indicate that staffing patterns reflect the type of service, the case mix, and so forth. In fact, 30 to 40 percent of the variance in staffing is explained by hospital type. The greater challenge lies in explaining the remainder of the variance.

For instance, we should look at hospital ownership. An economist colleague—I do not necessarily subscribe to his research—has hypothesized that proprietory hospitals would be much more consistent in their staffing patterns than would voluntary hospitals. His reasoning is that after all, proprietory hospitals are subject to some sort of profit motive and there exist prices of these various inputs and they somehow maximize something and come up with a unique set of inputs that they want to implement. The voluntary hospital faces so much constraint that therefore you find all this variation.

There are problems with that. The differences in case mix and different kinds of patients are treated differently, and I do not know that I believe it, but this is the hypothesis that is suggested—that we should be wondering about the ownership in addition to the reimbursement arrangement.

In addition, we have to consider that there are differences in consumer incomes. This is brought out in the paper. If you go to a county hospital in California, Los Angeles County or Cook County, there is going to be a variation in staffing and there is going to be a variation in the consumer's ability to pay. There is nothing irrational about it. It may be objectionable in terms of what our social objectives are, but it is not irrational. There will also be different staffing patterns, presumably, if there are great variations in the wages different kinds of nurses are paid. The question of different kinds of licensure arrangements has been brought up. There are various types of bargaining situations, in fact there are a host of factors I think should be investigated. They should be investigated primarily so that we may have an idea of what kind of staffing is desirable. We have to find out why hospitals are not staffing the way we want them to and determine how we might get them to go in the right direction.

In closing, I applaud Mr. Griffith for getting into some very interesting questions. His model was not specific enough for the conclusion that we do not see staffing as a random or nonsystematic process. We should have further research in this area with a view toward implementing the staffing requirements that may be desirable.

Nursing Directors as Participants in Hospital Peer Review Boards

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Introduction

Nursing personnel comprises one of the largest departments in a hospital, and next to medical departments, the hospital's most central. In this highly important department, the quality of patient care is of paramount importance. This may be due to the training and interest on the part of nursing personnel and supervisors (*1*) as well as to demands by consumers.

However, the consumers and payers of health services strain under present hospital costs and desire some cost control. Any program in cost containment in a hospital must involve nursing because of its size as a cost center. However, because cost control is not of the highest importance to nursing, any cost control program must provide a means of satisfying nursing's needs of offering quality patient care and service.

One way of trying to contain costs and maintain quality patient care is to use a combination of the carrot and the stick. The stick we report here is that of peer review in connection with the use of engineering standards. The carrot, detailed elsewhere,[1] is that of monetary incentive for better than budgetary performance. These are only two of the many possibilities, but these are of interest to this researcher because of their use of interpersonal communication (*2*) and decision making (*3*).

Let me illustrate with some problems. Place a director of nursing on a budgetary review board of peer administrators and what happens? What kind of impact does the director have on a nursing budget and what is the effect relative to the influence of "peer" administrators? How does the peer review process operate in relation to cost containment and patient care?

The peer review notion assumes that a nursing director is a peer of the head administrator and controller. The director, like all managers, must schedule, supervise, control, plan, and encourage. What kinds of interests and skills does the nursing director have to do this, and does peer review improve them? If the administrative knowledge increases, is this seen in relationships with subordinates and in relation to cost and performance?

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[1] Elnicki, Richard, personal communication, 1971.

Answers to these questions may vary with the size of hospital, the social and technical operation of the review board, the social and technical environment of the board, and the background of the nurse, such as the nurse's training and experience. That is to say that organizational, group, environmental, and individual variables may affect the nursing director's performance and learning in peer review.

We report here aspects of a 3-year experiment in cost containment using peer review, engineering standards, and monetary incentives. We explore the above questions about the nurse in a peer review setting. The important organizing distinctions are technical features outside and inside board meetings and organizationsl problems outside and inside the meetings. The next section describes the setting and design of the peer review experiment. Sequel sections report results relevant to nursing directors for the 3 years of the experiment.

The Experimental Design

Half of the 36 hospitals in a small State "volunteered" to participate in an experiment in cost containment by peer review boards. The 18 hospitals not in the experiment were used as a control group for economic analyses and comparisons, reported elsewhere. Some wished to participate, but others were persuaded to participate as necessary for the sake of the health industry.

The 18 experimental hospitals were divided into three sets—small, medium, and large—of six each. Small hospitals had fewer than 100 beds, medium hospitals, 100–250 beds and large hospitals, 250–1,000 beds. Each of these three sets was divided in half. From each of the hospitals in this final classification, peer review boards were constructed. During the first year, each board reviewed four departmental budgets (nursing, medical records, housekeeping, laundry-linen) of each of the other three hospitals of similar size. The planned life of the experiment was 3 years with expansion in the last 2 years for a greater number of departments to come under review.

Setting

A meeting of a board took place at the hospital under review and lasted a full day. All 18 reviews took place during the last 3 months of the calendar year, which were the first months of the next fiscal year. Meeting rooms varied from a spartan hall with assembled table and chairs to plush board rooms. Lunch and coffee break snacks were part of the routine at all meetings.

The target hospital lined itself up along one side of the table and each of three review hospitals queued up along the other three sides with each hospital staying together as a group. This procedure tended to structure the situation as a court of inquiry. If department heads participated, they, waiting like witnesses, sat around the periphery of the room. There was no discussion of alternative designs, such as not sitting by groups or constructing circular tables.

Subjects

The board consisted of nine members: three administrators, three controllers, two nurses, and a trustee. This means that each hospital contributed an administrator and a controller and that two of the three hospitals contributed a director of nursing and the third contributed a trustee. Most of the members knew each other before the experiment through their professions. The larger the hospital, the longer the tenure in office of each person and, consequently, the more known and respected he was. Because of the division by hospital size, board members were still relatively peers.

Controllers usually sat next to administrators from the same hospital, facilitating consultation between them. This structure changed slightly in later meetings with nurses, the least experienced in budgeting, tending to sit together. The staff coordinator for the group (described in a moment) acting as secretary-consultant, was located near the target hospital in small and medium size hospital meetings. The large hospital boards found the coordinator, acting as chairman, sitting opposite the target hospital.

The chairman was to be selected at each meeting. In the small hospital boards, the coordinator preferred not to be chairman, contrary to the board's wishes, and an administrator was elected. The full responsibility of the chairmanship became apparent when the coordinator felt the board should accept the responsibility for informing the target hospital of the board's decision on the first department. This procedure apparently went a long way to create commitment and responsibility by this group for its decisions.

In the boards of medium size hospitals, the coordinator took a strictly advisory role. The boards tried functioning without a chairman at the first meeting. However, it was apparent to them that a chairmanless group floundered. A controller was elected chairman for subsequent meetings, and this responsibility generated more extensive preparation on his part.

The coordinator of a large hospital took the role of chairman, which satisfied his own inclination to get things done and relieved the group's anxiety about what to do. This violation of the intended functioning had its positive and negative effects. The coordinator positively led with priming questions about the budget, trying to get the board to take an active part, while the group negatively became dependent on the coordinator for leadership.

Task Environment

Each board was supplied a staff member, the coordinator, who helped construct budgets and gather together correlative data. The budget itself, the first year, was constructed for each of four departments: nursing, medical records, laundry-linen, and housekeeping. In the second year administration, pharmacy, and operation of plant were added. For each department, salary, nonsalary, and depreciation figures were generated, line-by-line, according to a standardized recording system. Data sheets reported the expense budget for the previous year, the actual results of the preceding year, and the expense budget for the coming year.

Correlative and supplementary data were of three kinds. One was quartile expense comparisons with all other hospitals in the State, for each department. This report is a standard report generated by a national association. The second report was a biography of the hospital's operation. This included kinds of nursing care and bed complement, or how housekeeping handles the cleaning and janitorial jobs. The last report was a systems engineering report on each department specifying the number of personnel needed to do the job in each department. These data were generated by having an industrial engineer visit each department, interview various personnel, and then have the engineering firm convert the data based on standard formulae into personnel requirements.

Instructions

Boards were instructed to use any of the information to come up with a decision concerning the budget. The board had the authority to change any part of the budget they saw fit that did not stay within reasonable historical practices of the hospital. The board's judgments were to be made with the hospital under review removed from the meeting. Also, the target hospital did not have the right to bargain, debate, or change the board's decision. However, it had the right and responsibility of informing the board of justification for the submitted budget.

The board was not told how to organize other than that a chairman was to be elected from the board at each of the meetings. The board could use the staff coordinator as it wanted.

Incentives

A monetary reason for participating was that a hospital would be reimbursed for performing better than its budget. This reimbursement would be distributed at the end of each year and supplied by the Social Security Administration and Blue Cross. However, once the experiment started, immediate problems of planning and learning about management took on an autonomy of their own. The opportunity to learn was an inducement also, although the need to learn how to control costs may have been driven by a fear that "outsiders" might force something to be done to control costs.

These observations stemmed from interviews with board members. Attendance at the meetings yielded some further ideas on motivations after the experiment started. These were desires to learn and desires to look good in front of peers.

Relevant to the desire to learn, small hospitals historically had done little specific breakdown budgeting. Participating forced them to budget and learn how to budget effectively. Although the large hospital had budgeted for years, its budget had grown so that the experiment provided a means for sorting out budgetary complexities.

Also, the turnover in administrative personnel in the experiment's 18 hospitals had produced a situation where about one-third of the members were relatively new to their jobs. In these cases, the experiment provided a means for learning about their own hospital's operation as well as getting some professional feedback to their initial decision.

Taking a look at self-presentation motivation, we found that for those who had been in their positions for a considerable time the meetings provided a means to show off their facilities and personal skills. The carpeting in the meeting rooms of the experienced hospitals was thicker, food better, and visitation of new wings occurred more often.

This looking-good motive carried through in constructing a budget. There appeared to be a desire to construct a tighter budget than that of a similar hospital. This desire could conflict with the monetary incentive, because the tighter the budget, the less likely the possibility of receiving a monetary reward.

Data Collection

Three kinds of data were collected. These were questionnaire, content analysis of audiotapes of all board meetings, and personal observations and interview. Questionnaires were sent to the 54 participants before and after the set of meetings each year. Fewer than half the participants rssponded. All meetings were tape recorded, and observation occurred in more than two-thirds. Details of questionnaires, coding systems and analyses can be found elsewhere (*4,5*).

Results

One way of classifying the social-psychological results is to describe the social and technical problems inside and outside the board meetings. Where appropriate, we note differences between different size hospitals and nurses with different backgrounds. We do not report the details of the economic results other than to note that as of this time, the first year resulted in no differences between the experimental and the control group hospitals in their actual financial performance.[2]

Technical Problems Outside the Board Meetings

Before the boards could meet, budgets that were comparable and consistent between hospitals had to be constructed. Engineering standards needed to be set, and rules for reimbursement were called for in some detail.

Because of the shortage of time and experience, these three problems were handled relatively poorly the first year. Except for the small size hospitals, all hospitals had budgeted using State hospital association guidelines. However, there were still differences between hospitals on allocation of costs to departments. Even within a hospital, budgetary procedures changed annually by small degrees.

The engineers had to hustle to get data on the frequency of microtasks performed in each department. Often the hospital personnel had to supply data that were hard to obtain or were inaccurately reported. The result was that engineering standards lacked credibility.

Finally, the development of rules for reimbursement was delayed until the end of the first year when they were to be actually used. This procedure raised decision making problems for the boards, which is taken up in a subsequent section.

By the second year, the first two problems of uniform budgets and complete engineering data had been, for the most part, corrected. However, rules for reimbursement had not been developed and were not considered until after the second year's review board meetings. When they were considered, they were treated differently by different hospitals.

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[2] Elnicki, Richard, personal communication, 1971.

The small hospitals decided to use a step variable procedure that called for adjustment of budgets to volume, not on a linear basis but on a step basis. For example, for every x-thousand patient days' deviation from the projected patient days, staffings would be adjusted by one FTE. Rewards would then be based on a justified adjusted budget.

The medium size group talked at length about using a form of step variable but was unable to come to agreement. The large hospitals decided there was no way to adjust budgets and, therefore, gave no rewards or penalties. Some thought there should be no adjustment for volume. The argument used was that a household does not change its income and budget for volume but instead tightens its belt. Others thought there should be adjustments but people could not agree and said the problem was too complex.

The nursing department exemplifies these complexities. Staffing depends on the available part-time and full-time employees in different grade levels, the number of nursing units, and the opportunity to switch personnel from unit to unit on a daily or hourly basis. It also depends on the variability of patient demand. With ample part-time help and relatively continuous units, staffing can adjust to volume if the director has the skills to do the juggling act. On the other hand, if a hospital had a few part timers, separate units and stable demand, clear step function adjustments could be made. These two extremes made it difficult for participants, including nursing directors, to agree on reimbursement and budget adjustment.

Technical Problems Within the Board Meetings

This area includes the kind of data supplied to the board, the form that they were in, and the rules for how the data were to be used. The forms for data reporting were literally hard to read and had too much raw data without useful summary statistics. Also, the use of data, particularly if contradictory, was left to the boards to work out. The result was that complex data were ignored, and simple decision rule of normal historical increases was used. This course of action was of least effort for them.

This meant that between hospitals, comparisons were difficult to make, and within hospitals, comparison to engineering standards was rejected. The reason for the latter can be understood by looking again at the nursing department as an example.

The engineers constructed staffing standards based on national norms for microlevel tasks. The nursing department supplied information on how often each microlevel task had to be performed. The engineers then cranked the frequency of tasks and time per task through a formula to come up with a standard. This was a classical industrial engineering approach of time and motion.

The problems with time and motion studies are well known and these problems occurred in this setting. The problems were as follows:

- The shortness of the study gave the nursing director little help in determining how to change and implement the staffing change if the engineering standards called for fewer nurses.
- The time pressure to get data forced the nursing employees who filled out the frequency of task questionnaire to fill in fictitious data.
- There was no one engineer regularly available to help the nurses collect the data and answer questions.
- The final staffing standard was not explained to nursing's satisfaction; the engineers said the formulas were too complicated and their expertise would have to be trusted instead.
- The standard was a single number with no confidence interval. Neither the nurse nor the board could determine how far from the standard was really acceptable or unacceptable.

In summary, bad data, hidden procedures, and unaided involvement produced a relative rejection of the engineering standards by the nurses and the boards. The boards' suspicion of the standards led them to using the standards only when it was to their benefit. One nurse said, "I don't believe the standards, but if it makes my department look good, I'll push the board to use them so that my budget is accepted."

Organizational Problems Within the Board Meetings

The concepts of intergroup relationship and decision process became clear during the first year as useful for describing peer review. We had expected that concepts such as conflict and influence between peers might be more important (*6*). In the first year, the strong difficulties of technical problems inhibited these phenomena from clearly emerging. Instead, all participants were in the same boat of grappling for understanding. With no one knowing the rules of the game, conflict could not appear.

The decision process for the review of a particular budget followed a three phase sequence of search, analysis, and decision. These parts have previously been noted as essential components of a group decision process (*7,8,9,10*). Search includes learning, concept formation, and information generation. Analysis encompasses problem solving, comparison and contrast, and evaluation. Decision involves the acceptance, rejection, or change of the budget.

The intergroup relationship was seen as one between a review board and a hospital. This relationship was viewed as consisting of the co-occurrence of strategies by board and hospital. The strategies and relationships were thought of as varying with the search, analysis, or decision stage of the decision process.

The strategies, as measured on the questionnaire the first year, were not evident to the participants before the meetings started. Because of this uncertainty, the nurses met in a preliminary session to acquaint themselves with the data and possible selection of strategies. We observed the following strategies at the meetings. During the search phase, the board was passive and the hospital made a presentation of the budget. The analysis stage usually found the board proceeding through a budget line-by-line. Also, much time was spent on managerial discussion. The decision phase usually saw some discussion and consensus on a decision.

The nursing budget was presented with percentage breakdown for subunits and changes from previous years. Often, background information was supplied by the director on the wage structure and staffing patterns. Nurses on the board usually questioned the figures by comparing them with their own hospitals. The general tone was one of trying to understand the nursing department. This type of strategy was not used as much, if at all, in the other departments. This may have been because directors of other departments were usually not present.

The reasons given for increased costs in nursing were salary increases or increased staffing. The latter created confusion when the hospital budgeted for unfilled positions that it really did not expect to fill. It seemed that nurses would set budgets according to an idea that was not ever possible to attain. The board feared cutting the vacancies in case the nurse might actually be able to hire.

There was time spent discussing the number of nursing hours per patient day and the staffing mix. These areas seemed to be ones of hospital philosophy and generated much managerial discussion. The total time spent on analysis of a nursing budget was 47 minutes on the average.

The decision phase took about 15 minutes and no budget was cut. Some budgets were tabbed for a further look at reward time for what to do with unfilled positions (vacancies). The nurses were not as active in the decision phase as in the previous two phases. In ratings of who contributed to the group's decision, controllers rated highest, administrators next, and nurses and trustees least.

The second year, a fixed set of strategies for each phase was selected by the researcher for measurement. Participants, acting in the role of board members and then in the role of hospital members, rated their preferences before the meeting for the kinds of strategies preferred. The observers rated the actual use of strategies. Table 1 reports strategies for each phase and the intercoder reliabilities. From these data, we look at the intergroup problem and the influence of nurses.

Across all budgets we found no differences between the board and the hospital in their preferences for joint strategies. This held up for all three decision phases. The key finding, instead, was that during the search and analysis stages the participants' strategy preferences were negatively correlated with their actual strategies performed. The negative correlation was highest for controllers. During the decision phase the correlation was positive, with the nurses' preferences correlating highest with performance. However, the nurses were rated by their peers as having the lowest influence over all participants the sec-

Table 1.—Interater reliabilities for all strategy items

Board strategy	Hospital strategy		
	Learning stage		
	Presentation	Exception report	Nothing
Group study	0.90	0.90	0.86
Individual study	0.98	0.23	1.00
No study	0.99	1.00	0.98
	Problem solving stage		
	Unusual increases	Normal increases	Management discussion
Compare and contrast	0.15	0.71	0.33
Line-by-line review	0.74	0.72	0.82
Management discussion	1.00	1.00	0.71
	Decision stage		
	Satisfied	Questions	Protests
Accepts	0.94	1.00	1.00
Delays	0.99	0.82	0.84
Changes	0.69	0.84	1.00

Table 2.—Mean contribution and influence rating according to role (N = 16)

Role	Contribution	Influence	Average
Controller	3.4	3.5	3.5
Hospital	3.3	3.3	3.3
Chairman	2.9	2.5	2.7
			$p = 0.01$
Coordinator	2.4	2.4	2.4
Administrator	2.0	2.4	2.2
Nurse	1.5	1.2	1.4

ond year, averaged over all the budgets (refer to table 2).

These second year results support the results of the first year that, generally, the nursing directors were relatively powerless during most of the review but influential during the nursing budget. However, this could be due to the diminished attendance of nursing directors from the small and large hospitals. The nurses from medium size hospitals attended meetings regularly and were very involved in their own budgets.

The third year saw the large hospitals dropping out of the experiment and nursing directors in small hospitals not attending meetings, often because of a turnover in this position. Of the four directors for the medium size hospitals, all attended the meetings, and three of the four found the peer review experience valuable for increasing awareness in how to manage a budget and the department.

Organizational Problems Outside the Board Meetings

In the section on experiment design, we noted nonsystematically some of the organizations involved in this study. A listing of the organizations and their relationship at the beginning and during the experiment supplies a further basis for understanding the experimental outcomes.

The experiment was designed by the State Hospital Association with the advice of an engineering firm and was supported by the Federal Government and Blue Cross. Hospitals of various sizes were involved in the design to the extent they wished, which often meant that administrators encouraged the idea. The professional associations for administrators, controllers, or nurses were not involved.

Because there was a short lead time in starting the experiment, the actual participants had little hand in the design, little time to come to grips with the experiment. In addition, it became apparent that in the large hospitals the administrators who pledged the hospital's participation were too busy to participate. Also, the controller and nurse were not sold on the value of the experiment. The large hospitals dropped out after the second year without administering rewards or penalties.

During the experiment the large hospitals became interested in prospective reimbursment. Although they did not openly endorse this alternative, privately they spoke of its advantages, which were being able to control costs and place the blame on outsiders.

The engineering firm had trouble resolving the problems with engineering standards. This was partly because they had vested interests in the design of the experiment and because they assumed that having been apparently successful with the same hospitals outside the experiment, the failures within the experiment were not their fault. It appeared that hospitals were willing to use engineering standards in behalf of *a priori* plans they wanted to institute. Hospitals were not interested in using engineering standards if the engineers went counter to hospital plan and policy.

As for the nurses, they did not coalesce as a group. Some half of the eight who had some minimal administrative experience and training said they increased their awareness of cost problems, but they could not identify any changes in the nursing department. The other half thought it was a waste of time. The four with little administrative experience had left the nursing director job during the experiment. Their replacements were hired with better managerial skills.

The problems the first year were blamed by the hospitals on the experiment staff and engineers, by the staff on the hospitals and engineers, and by the engineers on the other two. The relationship among these three groups varied, but generally it was distant to hostile.

Discussion

Looking at all four areas of technical and organizational problems inside and outside the board meeting, we might speculate on the order of importance of the areas. This speculation requires an assumption. We assume that the thread linking the areas is that of utilization and development of human resources for the goal of cost containment. Or more simply, conscious participation is the key. We have in casual order then, the external organization, the external technical, the internal technical, and the internal organization.

We suggest that the lack of participation of all relevant parties in designing the experiment led to low understanding in the execution of technical problems of budget construction and engineering standard estimates. This low understanding was critical in producing problems in these areas. Nurses did not participate in design and consequently fed fictitious data to the engineers because of low understanding that came from low participation. This analysis assumes that participation is useful both for utilizing resources, such as the controllers, and for developing resources, such as the nurses.

These technical problems were carried into the board meeting with bad data, few ways to process the data, and rejection of engineering standards. At this point, only awareness of the problems and development of ways to overcome them would have worked. But neither the board's chairman nor the nurses, among others, showed skills at organizing, such as listing goals and search, and analysis and decision strategies to accomplish the goals. The idea of participation becomes further refined because of the boards. Participation without awareness of alternatives can be something even less than muddling through (*11*).

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Social Psychological Factors Relating to the Employment of Nurses

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Introduction

The general purpose of this paper is to examine factors that are antecedent or contiguous to the decision of a nurse to be employed. The decision to participate in the occupation is of great significance to nursing and to the public. Not only has the occupation of nursing been unsuccessful in producing adequate numbers of professional nurses but, also, large numbers of the best prepared members are utilized in educating nurses who never work after their first child is born.

With greater knowledge of the nature of the differences between nurses who work only during periods of financial exigencies versus those who actively seek long term professional careers, nursing school faculties might attempt to select students who are more likely to work for extended periods. Also, with better understanding of the cultural determination of certain values held by the students, it would be possible to modify these through the process of socialization into the profession.

The general theme of this paper is related to a view of the traditional role of women and the deleterious effect this has had upon the development of women and thereby the development of the profession itself. Consideration will be given to alternative ways to view "women's place" and the manner in which nursing can align itself with some of the current social and psychological forces that are redefining the roles of men and women. There are economic and political forces that can support an expansion of nursing's contribution to the health services of this Nation as the profession documents that it can assume these new responsibilities.

In 1973, one hundred years will have passed since the first schools of nursing were established in the United States. However, the next 10 years will afford nursing its most crucial tests. Can the profession adapt and grow in the face of social changes that will require that it modify its very nature? The new, expanding clinical roles in nursing demand career continuity, independence of judgment, and initiation of action that are not congruent with the feminine image of employment inactivity, dependency, and passivity.

Psychological Development

A brief review of selected aspects of the psychosocial development of identity in women and men follows. Bardwick's *Psychology of Women* (1971) provides a useful frame of reference, as does Branden's *The Psychology of Self-Esteem* (1971). *The Adolescent Experience* (Douvan and Adelson, 1966) and extensive study of adolescence provides supportive data.

Bardwick (*1*) has reviewed the most influential formulations of personality development. Although she describes Freud's genius as "unassailable," she rejects his ideas about the psychology of women as reflecting political sentiments rather than scientific investigation. Freud saw a male dominated culture and believed that the penis was the symbolic source of this power. Karen Horney rejected the idea that women suffered from "penis envy." Horney believed that the female's capability of creating another human being left men with profound envy that could only be resolved by seizing cultural and political power. Bardwick views this as a reaction-formation idea and rejects most of it. The third point of view, currently popular, is that there are no real differences between the sexes that extend beyond the biological, and thus all differences between the sexes have merely been imposed by a masculine dominated society. Bardwick rejects this notion also. Bardwick takes the position that there are fundamental biological differences between the sexes but that traditional role divisions are too restrictive and that cultural changes in sex roles are necessary.

It is unlikely that the nature of biological differences upon cognition, for example, can be accurately assessed until cultural restraints have been removed. The general psychosocial development of boys and girls is outlined below.

Childhood—A Sense of Self

Bardwick states "the basic sense of self, as a separate entity, probably begins to develop around the age of 2, when a child begins referring to himself as 'I.' " Previously dependent on his parents for emotional and physical well-being, his sense of self develops to a great extent through his interactions with his parents and is dependent for its well-being on parental approval. Equally prominent at this stage are the developmental tasks of the child—the cognitive, physical, verbal, and interpersonal skills that the child seeks to master. Success in this area receives parental approval, and the child recognizes a new source of enhancing his well-being.

Sexual Identity

The child seeks a stable self definition and one of the "givens" he can readily grasp is his sex, which he begins to recognize at the age of 3. At approximately the same age the boy begins receiving less parental approval for dependent behavior; likewise, emphasis is increasingly placed on his mastery of skills. As parental approval becomes a less reliable source of well-being, as independence and skill mastery are stressed, he begins to rely less on others and more on self for his feeling of well-being. He comes to understand that masculine identity (masculinity) correlates with independence and achievement and adjusts his behavior accordingly. He develops internal criteria by which to judge and reward himself and, correspondingly, internal means of control. Bardwick believes masculinity becomes a crucial issue for the boy at age 5, that he uses the latency years to formulate his concept of masculinity and comes to a healthy adolescence with a fairly stable conception.

In line with the cultural definition of femininity the girl is allowed, in fact encouraged, to remain dependent. While achievement is important to her self concept, she continues to depend primarily on others for rewards and controls, in effect for her self definition. Thus her emphasis is on the interpersonal; others rather than self remain her most effective source of well-being. Her skill in dealing with others (interpersonal skill) becomes important. Our culture is more tolerant and indulgent of girls. Accordingly, there is less emphasis during the latency years on femininity; "tomboys" are allowed. Bardwick believes that feminine identity does not become a crucial issue until adolescence.

Self-Esteem

The child's efforts to gain a sense of self and a feeling of well-being refer to the dual processes of achieving identity and esteem. Branden defines self-esteem as the "integrated sum of self-confidence and self-respect. It is the conviction that one is *competent* to live and *worthy* of living (*2*).

As the boy develops, his self esteem increasingly comes to depend less on others, more on self. The stress on the independent securing of satisfaction and control foreshadows the development of autonomy in adolescence. But the dependence fostered in the girl makes "the other" crucial to her self-esteem. Bardwick states: "While the interpersonal rewards remain salient for girls, internalized criteria of achievement and personal satisfaction become more important for boys (*1*)."

Adolescence—Identity

Branden defines personal identity as "the sense of being a clearly defined psychological entity (*2*)." Douvan and Adelson note that although identity does not begin in adolescence, it becomes critical at this time:

> During this period, the youngster must synthesize earlier identifications with personal qualities and relate them to social opportunities and social ideals. Who the child is to be will be influenced (and in some cases determined) by what the environment permits and encourages (*3*).

The key terms in male adolescent development are "the erotic, autonomy (assertiveness, independence, achievement), and identity," the key terms for the female—"the erotic, the interpersonal, and identity (*3*)." The one discrepancy in terms—autonomy vs. the interpersonal—shades the entire course of adolescent development. The identity problem for the girl revolves around "the interpersonal," for the boy "autonomy" is the central issue:

> Identity is for the boy a matter of individuating internal bases for action and defending these against domination by others . . . (for the girl) it is a process of finding and defining the internal and individual through attachment to others (*3*).

This feminine dependence on "the other" leads Douvan and Adelson to question the validity and relevance of the concept "identity crisis" to the adolescent girl. In her early years, the girl learns to depend on others for her self-definition and her self-esteem. In adolescence, with cultural, parental and peer pressure focusing on the importance of femininity as preparation for the wife-mother role, heterosexual affiliation becomes crucial. Douvan and Adelson believe the adolescent girl does not have the time, the energy or the motivation to focus on identity resolution. Popularity, especially with the opposite sex, absorbs most of the energy. Further, "too sharp a self-definition and too full an investment in a unique personal integration are not considered highly feminine (*3*)," and might therefore reduce eligibility.

Marital Status and Female Identity

The girl's identity is bound up not so much in what she is but in what her husband will be. Someone has spoken of marriage as a "mutual mobility bed." We may add that for the girl it is equally an identity bed (*3*).

Bardwick arrives at the same conclusion:

> The only way to achieve a feminine sense of identity, if one has internalized the general norms, is to succeed in the roles of wife, helpmate, and mother. . . . As a man's self-esteem is linked to his appraisal of his masculinity, apparently a woman's self-esteem is similarly linked to her feelings of feminity. The difference between them is that the goal of esteem and identity is achieved much later in life by women and is primarily achieved in the traditional intense and important relationships rather than in occupational achievement (*1*).

The little girl's potential wife-mother role determines the pattern of her socialization. Although it is allowed that she may at some time work outside the home, the focus is her traditional sex role and the "feminine" qualities of dependence, deference, nurturance, and passivity. She has been successfully socialized when she assumes the socially approved status of "Mrs." Mead has written, "Success for a woman means success in finding and keeping a husband (*4*)."

Although it is assumed that the little boy will be a father, his socialization focuses on his future occupational role. He is taught to be "masculine"—independent, aggressive, competitive, achievement oriented.

Marriage provides a socially approved arrangement for bearing, rearing, and caring for children.

But marriage also "offers social recognitions, social place, and designated roles and thus gives its members a vital form of social security (*5*)." While this statement has implications for both sexes, it has special and essential implications for women, whose primary role is wife-mother, whose "place" is marriage and motherhood.

A recent article in *Cosmopolitan* opens with the following statements:

> As an unmarried woman, I am suffering a profound identification crisis. I am a spinster.
>
> Spinster is, quite simply, the legal description of the unmarried adult female. Why should the unmarried adult male, or bachelor, be a figure of glamor, and the unmarried woman, or spinster, a pitiful lump (*6*)?

Although the psychological implications of being single are not well explored in the scientific literature, Sakol focuses on two concepts pertinent to an understanding of single women. The first, "identification crisis," is self-evident. The second, lack of self-esteem, is implied in the phrase "pitiful lump."

The unmarried woman does not assume the traditional feminine role and thereby exists on the fringes of the social structure. She may work and contribute to society through her work, but it is not quite acceptable for her to define herself in terms of an occupational role—that is a man's role and calls for "masculine" behavior. A woman may be a sister, a daughter, a community participator, but these are not primary roles that readily lead to self-definition.

> There is no acceptable status setting name for the unmarried woman . . . except for the designation "unmarried," which is a designation by social default, as it were, not of a social status. The woman who remains single is ambiguously placed in the social structure (*5*).

By defining woman in terms of marriage and motherhood, society essentially limits woman's source of status, recognition, and security to the wife-mother role. By socializing little girls to dependency and passivity and a focus on the interpersonal, society effectively circumscribes woman's source of identity and esteem around husband and children.

The female's dependence on others for self definition leaves all women vulnerable—the married and the unmarried. The married woman is too dependent upon husband and children for her self definition. The belief that motherhood is a drive, anchored deeply in the biological sphere, leaves the woman who remains single to be viewed as abnormal and deviant. This may cause the single woman to question her normalcy. Having internalized the cultural definition of femininity, she questions her feminine identity. Unlike the man, who has developed internal standards and criteria for judging and rewarding himself, the single woman has learned to define and value herself as she is defined and valued by others. Society neither adequately defines nor values singleness.

Through processes of definition and social reinforcement the essentially broad patterns of normalcy in sex roles have become rigid sex stereotypes. Once the characteristics of the problem are identified, modification of the process of development generally becomes possible by altering the social influences.

Toward Resolution

> Women's ambitions are not fixed—either biologically or culturally. They are subject to change in response to circumstances. . . . There are crises, or critical transitional experiences which stimulate a reorganization of values and patterns of aspiration and gratification (*7*).

One can question the health of a society that so narrowly constricts a woman's source of identity and esteem to one primary role. Mannes credits the mass media for women's obsession "with an ideal of femininity as the guarantee of happiness (*8*)." Bettelheim feels our view of women is "psychologically immature (*9*)."

Bardwick reflects on the awareness of parents who encourage their daughters "to view the love of a man and the raising of children as the self-defining, self-esteeming achievement, limiting achievement to the traditional tasks and the need to affiliate (*1*)." She feels it is "dangerous for a woman's sense of worth to be enormously dependent upon her husband's reaction to her and to her contribution to his welfare (*1*)."

In the process of resolution, women may consider Branden's examination of the psychology of self-esteem, contrasting his statements with the current cultural definition of femininity. Branden states:

> A strong sense of personal identity is the product of two things: a policy of independent thinking and the possession of an integrated set of values (*2*).

Further in his discussion:

> A psychologically health man does not depend on others for his self-esteem; he expects others to perceive his value, not to create it (*2*).

Branden briefly mentions:

> . . . the incalculable damage that has been wrought by the conventional view that the pursuit of a productive career is an exclusively masculine prerogative, and that women should not aspire to any role or function other than that of wife and mother. A woman's psychological well-being requires that she be engaged in a long range career; she is not some sort of second class citizen, for whom mental passivity and dependence are a natural condition (*2*).

Before she can find identity and esteem in her work the woman must have new values that ensue from a fresh, healthier self-conception. Branden believes "the cause of authentic self-esteem is . . . the rational, reality directed character of mind's thinking processes (*2*). He designates "five interconnected areas that produce enjoyment of life: productive work, human relationships, recreation, art and sex (*2*)." While one may disagree with his categories, it is worthwhile to note he does not refer specifically to marriage and motherhood.

To take another perspective, Baker notes that marriage and parenthood are not a man's "primary avenue to personal identity" . . . nor is his fulfillment as a human being dependent on "the biological process of fathering a child (*10*)."

Mead states the problem:

> Every known society creates and maintains artificial occupational divisions and personality expectations for each sex that limit the humanity of the other sex (*4*).

What needs to be questioned is not a woman's desire to marry and have children but rather the fact that her self-definition primarily focuses on her biological role. It is time to question the relevancy and desirability of archaic conceptions of "masculine" and "feminine" that arbitrarily limit one's personal potential to biology.

What is needed is a more human definition of male and female. In a recent article, Linner discusses three sex role systems. In the "patriarchal system," the male is the provider and therefore superior. This system may be efficient within the family but Linner feels it has negative consequences for society. The "Complementary sex role system," although claiming men and women are equal, retains an emphasis on basic differences between male and female. The "human role system" acknowledges the differences between the sexes but sees them as secondary (*11*). This system proposes the possibility of balancing male and female sex roles and working toward a new "human role." As human beings we, in reality, play many roles. To focus so exclusively on one limits our humanness. A society threatened with extinction may need to impose such limits. Our society not only needs the rich complexity of individual human potential, but it can not really afford to do without it.

Implications for Nursing in Resolving Rigid Sex Role Conformity

Career Choice

In the childhood years a girl is encouraged to achieve in school. But adolescence brings a cultural emphasis on femininity and feminine behavior. Passivity, dependency, and deference are qualities that conflict with those that spell academic success; for example, competition, aggressiveness, achievement. Commenting on the girl's educational dilemma, Meade noted that girls are expected to display enough ability to be "successful, but not too successful; enough ability to get and keep a job but without the sort of commitment that will make her either too successful or unwilling to give up the job entirely for marriage and motherhood (*4*)." A recent study by Constantinople reveals that college reduces conflict for men since it equips them for occupational success but increases conflict for women. The emphasis on competition and occupational competence and achievement does not correspond to the feminine ideal (*12*).

The natural congruence between the traditional role of women and the occupation of nursing has made it easy to recruit girls for nursing. When nursing programs were relatively inexpensive and students had paid, in tuition and service, for their education by the time they graduated, the fact that many chose not to be employed was not a serious problem. Nursing has continued to condone this practice when it can no longer be defended.

Vaillot has written that the committed nurse is one who views nursing as a means of achieving being, as a vital way of expressing and defining the self. Although the subjects of her study overwhelmingly ranked marriage and motherhood as primary, she postulated that this does not preclude commitment because students see marriage and motherhood as a natural extension of their commitment to nursing *(13)*. Douvan and Adelson demonstrate that girls who choose feminine occupations such as nursing view these occupations as extentions of the traditional feminine role and as a means of expressing feminine qualities *(3)*. If nursing is an extension of the traditional feminine role, if the primary commitment is to marriage and motherhood, commitment to nursing is secondary and temporary.

Extrapolating from tables in *Facts about Nursing*, 1969, and *RN's 1966 Inventory* (the most recent national survey of registered nurses), it can be estimated that out of every 100 *married* graduate nurses 31.5 are inactive and not registered, 31.5 are inactive but registered, and 37 are employed. However, of these 37 nurses who are employed, 10 work only part time. Thus, out of every 100 graduates from schools of nursing who marry, only 27 nurses are employed full time at any one time *(14,15)*.

Nurses, individually and collectively, must rid themselves of rigid sex stereotyped thinking. Women who happen to be nurses must learn to see themselves as human beings who have a contribution to make and who have an identity greater than their feminine selves. Nursing as a human service is so tied to the nurturant role of women that nursing's professional role can expand only as the societal role for women expands. Nursing as an occupation and nurses as women must seek new definitions and new roles. The two processes must be concurrent and mutually supportive.

To suggest that nursing be made acceptable to males is to suggest that female nurses make themselves professionally attractive to males. This is the traditional approach that women have always used. If that were to happen, nursing would merely resemble more closely the professions of teaching, social work, and library science wherein women are dominant numerically but men hold all of the power positions. The image of nursing will not be altered simply by recruiting more men into the feminine occupation. Rather women who are nurses must free themselves from the narrow norms of femininity.

To conform to the mean of the norm leads to dull, unimaginative, steeotyped behavior. The important social changes are brought about by persons exploring the outermost edges of the range of behavior, which in turn is defined by one's personal system of values. Women who are alive and growing will develop new insights and values. This involves granting the individual nurse the right to be different without being labeled as deviant. Female nurses can be helped to live their full human potential so that nursing as an occupation will change and become a field attractive to both men and women.

Astin, Suniewick, and Divech, in their overview of studies on career determinants, have reported that there is general agreement that women with career orientations tend to be high achievers and in aptitude testing show high need for achievement and higher levels of endurance, introspection, and independence. These same tests tend to describe career oriented women as having a masculine orientation. The authors conclude,

> ". . . unfortunately the present clinical interpretation of a person who has interests and/or talents in areas that are descriptive of the opposite sex is that such interests and aptitudes reflect one's lack of acceptance of his/her sexuality and that the person is in some kind of psychological conflict. This interpretation warrants reconsideration in light of evidence that great numbers of women desire careers that have traditionally been viewed as careers for men *(16)*."

The entire practice of classifying occupations as feminine or masculine needs to be restudied. It is based upon cultural biases and produces poor science. The Strong Vocational Interest Blanks have been cited for their sex discrimination. It is not only that certain score configurations for women will suggest psychiatric social work and for men, psychiatry, but that the portrayal of the women's vocations are biased and restrictive (*17*). There is need to develop new vocational aptitude instruments that reflect potential for nursing careers of the 1970's and 1980's rather than the 1930's.

Career Without Marriage

> A generation ago women often chose between marriage and a career, or at least, these were seen as the principal alternatives. . . . The choice for career in place of marriage is probably no longer a consideration of young women. The new decision is for marriage alone, or marriage with career (*18*).

The single nurse internalizes the cultural definition of femininity and desires the socially approved status of marriage and motherhood. Coping with her "failure" to achieve woman's traditional role, the single nurse under 30 faces a crisis of identity and esteem. The dilemma delays, if not totally precludes, a serious commitment to nursing.

In 1966, there were over 150,000 unmarried nurses in the United States. Of those under 30, 95 percent were actively employed in the profession compared to 64 percent of married nurses in a comparable age range (*14*). Unencumbered by the responsibilities of marriage and motherhood, is the single nurse more likely to concentrate full energy on her nursing career? Is she likely to possess a higher level of career commitment? Or does failure to achieve the traditional role pose problems that preclude authentic commitment?

There are few studies of single women. Freeman, Levine, and Reeder note that historically middle aged unmarried nurses have been the most committed to the profession (*19*). In a 1968 study, Baker found single women achieve "adjustment and fulfillment through creative contributions to society" but the mean age of his subjects is 51 (*10*). Although it is assumed that women who pass age 30 without marrying review their life goals and expectations and readjust their self-image, there have been no studies of how this is achieved. Similarly, there has been little exploration of the dynamics of "being unmarried" for the 21 to 29 age group. Davis and Olson found nursing students primarily oriented to the traditional role, and they view this orientation as precluding serious career commitment (*20*). Mayes, Schultz, and Pierce considered student satisfaction with nursing as it influences commitment. They found students consider the career vs. marriage conflict a source of dissatisfaction and interpret this as an obstacle to commitment (*21*). Freeman, et al., document studies that identify marriage as the primary goal of nursing students, a goal they believe prevents many from a serious commitment to nursing.

> The prospect of marriage and children permeates every aspect of nursing; no aspect of the profession can be completely understood apart from the influence of marriage plans and their frustration (*19*).

Nursing can be a viable means of achieving "being" and self-definition. However, as long as the traditional role model predominates in the social and psychological development of young women, women will be incapable of achieving "being" through nursing. Their commitments will be half hearted. Nursing has never explored the nature of the problem whereby its services are provided by women who essentially remain aloof from a deep occupational commitment.

Marriage and Career

The research interest of the senior author has focused upon the decision of married nurses to engage in employment. The Barnard-Simon theory of organizational equilbrium provides a relational explanation of the high level of job turnover and underemployment within nursing. One of the central postulates of the Barnard-Simon theory states, "Each participant will continue in an organization only as long as the inducements offered him are as great as or greater (measured in terms of his values and in terms of the alternatives open to him) than the contributions he is asked to make." Another postulate of the same theory states, "An organization is 'solvent' and will continue in existence only so long as the contributions are sufficient to provide inducements in large enough measure to draw forth these contributions (22)."

To a very great extent nursing is dependent upon the employment of married nurses with children in order to keep the vocation "solvent." Yet these are the very nurses for whom there are the fewest employment inducements and the greatest personal contributions associated with employment. Simultaneously, the ready availability of the housewife role has made it easy to leave the field whenever the expected contributions appear to be too great and the inducements insufficient.

From a research point of view, the problem has been to make the theory operational; that is, to be able to measure the contributions and inducements as perceived by the individual nurse in order to predict when and under what conditions she will move toward labor force participation. The writer has been the investigator for two projects in this field of research (NU 00216-Decision to Reactivate Nursing Career and NIH 70 4123-Recruitment, Utilization, and Retention of Part-time Nurses). In the former study, use was made of a Consequence Questionnaire developed by Rosen and modeled after Vroom's cognitive model of motivation (*23*).

This instrument was designed to measure the expectancy and valence of the consequence of a change in work status. The nurse listed the advantages and disadvantages of changing her work status (inactive to active or active to inactive) and attached to each an estimate of the probability that the consequence would occur. The total consequence score was determined by the algebraic sum of the positive and negative consequences after each was multiplied by its probability. This instrument did not measure the theory's concepts adequately and thus was not a good predictor of changes in employment status. However, the listing of advantages and disadvantages when grouped by demographic variables such as age, education, and employment status resulted in an excellent reservoir of descriptive data.

From that study the writer concluded that "employment of married nurses can most often be characterized by the principle of immediate gratification, namely:

- rapid job turnover and change of work status when family problems arise,
- acceptance of dead end jobs that are compatible with family needs and demands
- work goals that focus upon maintenance of existing skills rather than upon advancement or growth (*24*)."

The goal of this research has been to explain or predict the employment behavior of married nurses. This has seemed appropriate since these are the women who have an option to exercise (*25*).

The writer's previous research (*26*) supports that of the other investigators, that financial need and absence of young children are the best predictors of which women will choose to be actively employed (*27,28,29*). However, there are large numbers of nurses who choose to work in the absence of financial need and before children are grown. Knowledge of the differences between nurses who seek employment under these conditions versus those who do not could provide valuable insight for the maintenance of a nursing work force.

Two of the variables hypothesized to have an effect would be the strength of the self-concept of the nurse and the family ideology subscribed to by the couple. The influence of the self-concept has been discussed. Whether the family ideology (husband-wife power relationships) is "patriarchal," "complementary" or "equalitarian" could be predicted to influence the extensiveness of the work role involvement of the wife.

Under the patriarchal system, employment of the wife would not be expected except in instances of financial distress. If the couple subscribe to a complementary ideology there would be employment of the wife if she wished to be employed and if the work role could be made compatible to her family role. Vacillating conditions in the home or in employment would be expected to produce irregular employment participation. Finally, the equalitarian sex role system could be expected to correlate most highly with serious long-term career involvement. The equalitarian marriage would afford the housewife-careerist the greatest personal support for the full development of her professional potential plus the greatest sharing of home and family responsibilities. Not all adjustments for home or family complications should be imposed upon the wife's employer. Increasingly such occurrences will be classified as parental rather than maternal responsibilities within equalitarian families.

Conclusion

The common delay of a serious commitment to nursing until the issue of marriage has been resolved causes many female nurses to waste, professionally, those age years between 21 and 30. These are the same years in which society dictates that young men will become vocationally established. Nurses under 30 years of age should become an important concern of the profession for it is the manner in which these women resolve their own identity (within or outside of marriage) and establish some sense of self-esteem and self-worth that will determine their long term involvement and contribution to nursing. The woman who views herself as a personal failure can never be a professional success. There is some evidence to suggest that women who marry after the age of 25 are more likely to combine career and marriage. It is probable that the woman's identity as a person, independent of any spouse or child, is sufficiently developed by this age for career involvement to be viewed as personally satisfying and rewarding.

Certainly there is evidence from the feminist movement that identity can be significantly influenced long after adolescence. "Rap" sessions in schools of nursing might well be used to help students (graduate or undergraduate) perceive their options for achieving full human potential, including or excluding the roles of wife and mother. There is need for controlled studies of the effectiveness of such socialization.

The passivity, deference, and dependency inherent in femininity and inherent in nursing limit professional potential. Woman's need for affiliation and approval makes her susceptible to others, whether she is seduced by sex or authority. Energy directed towards securing esteem from "others," be they medical or administrative personnel, diminishes energy to be directed toward change. Acceptance of the status quo results. To obtain a clearly defined professional identity, nurses must develop an occupational orientation. Traditionally, women have not defined themselves in a work role. Nursing independence requires an achievement orientation along with the qualities of aggressiveness, assertiveness, and autonomy—qualities that threaten feminine identity.

Nursing needs to question and challenge a traditional role concept that limits a woman's potential, creativity, and humanity. New definitions, new alternatives need to be explored. As long as woman's primary definition is wife and mother, nursing will be primarily defined as a feminine, nurturing, mothering profession. An emphasis on the "human role" would allow women and men, within nursing, to seek broader self-definitions, untapped avenues of participation in society and improved ways of delivering health care.

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DISCUSSION OF DR. WOLF'S AND DR. CLELAND'S PAPERS

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Miss Simpson

I would like to discuss the two papers in reverse order, starting with Dr. Cleland's. She has touched on the universal problem of recruitment selection and wastage of staff for nursing positions. Her arguments are very good; however one or two points did occur to me.

The first is whether we need to follow slavishly the career pattern that men set. I think we have to consider the resources we have and the needs we have to meet. We should I am sure be happy to have men with us as nurses and I believe that in my own country we have gone farther than you have here in incorporating them into the profession, not as men, but as nurses.

Single women living away from home in medieval times were known as "anilepi" women. They were thought to have no viable life of their own but throughout their lives they were expected to be dependent on a male member of the family, usually the senior male member. They held positions as daughters, sisters, or aunts. They were not independent. This has lingered with us, but not I think to the extent that we haven't broken away from it for women to hold happy, successful positions in their own fields of work.

This varies greatly from culture to culture. I was, for instance, astonished recently when I happened to be in a hospital. I had as a ward sister a very excellent nurse from Singapore who refused absolutely to address me as "Miss" because clearly this was insulting. To this day I am on the records of the hospital as "Mrs." I do not believe this would have happened had the ward sister been English.

It should be possible today for single women, for men, and for married women to mingle together in the nursing profession, finding their own position. But for the married woman with children, I personally have swallowed hook, line, and sinker the things researchers have identified in relation to the deprivation that children suffer when they are deprived of their mother's care in the early stages of their lives. In this way, of course, my public health biases come across very strongly, and I cannot reconcile the idea of the nurse who should be the health teacher setting the example of leaving the children. This I think you may strongly wish to dispute with me. This is my bias, which I am now declaring.

But I do wonder if we couldn't cash in on this situation, whether it is biologically determined or culturally determined—I don't know which it is. In nursing there are very many positions at the foot of the ladder. There are far fewer higher up, and I am not sure that wastage for child rearing is entirely dysfunctional. If we are preparing our nurses for health care as well as for sickness care, we may be able to rear a much healthier future generation if the mother understands the importance of child health. This is not only within her own family. As a member of the community in her peer group she can have a great influence on other mothers, and we should make it possible for her to contribute in voluntary service or in other ways to the health service during the time she is rearing her own family.

One of the problems is that we prepare nurses for a caring role that they have to change at some stage in their career either for a much more technical role or for an administrative or academic role. And I do wonder whether we could use this gap to train or retrain the women probably of about age 35.

Now, there is experimental work going on in the training of older women. We have done far less in thinking about the possibility of retraining our nurses for a rather different role when they come back. There is quite a lot of talk at present about the need for people in many occupations to retrain at 40. We might examine this possibility in relation to nurses who have a natural break in the late 1920's.

This leads us rather closely to the subject of the second paper. Here we saw all too clearly the problem of the nurse unaccustomed to the budgeting, management approach. This will need to be incorporated somewhere in her training period. In England, as you probably know, we are moving into a unified health service, and 1974 for many of us has a ring both of challenge and of anxiety. We have a critical path analysis program going on with the idea that in 1974 the transition will be made smoothly from a tripartite organization of the health service to a unified organization. One small segment of this scheme is looking at the management of areas, and it has been quite clearly stated that the nurse director, whatever she will be called in this new setup, will have to be able to develop and control the nursing budget, not only for the hospital but for the area as well. This is another thing for which we are not at present well prepared, and certainly for us this is one of the things we shall need to look at.

The other feature that came out so clearly in Dr. Wolf's paper was the problem of action research. It is not too difficult for the outsider to go in and describe a situation. We have many, many of these studies. It is when you try to work with people who are affected by the study that the problems start to arise. We should congratulate Dr. Wolf most warmly on his courage in coming here and telling us of the problems we shall meet. Those of us who have tried already know the difficulties to some extent.

He gave a most masterly exposition of the things that are going to happen and that we need to look at to arrive at a situation in which the research worker can genuinely help the people on the field and not merely find ways in which to describe them and criticize them. It is not difficult to go in and describe how badly a thing is working. It is a very different proposition to go in and help people to adjust.

Dr. Bognanno

I would like to make a few very general comments about each paper and then bring to your attention another body of research that is currently being undertaken by a handful of economists in the area of nurse staffing.

In my mind there is little doubt that the nurse staffing research dollar will yield a considerable return if it results in the successful development of operational schemes to motivate hospital economy. Two-thirds or more of most hospital expenditures are allocated to salaries, and we all know what has been happening to hospital costs in the United States over the past 15 years relative to costs in other sectors of the economy. Thus the study of the effect of peer review on the efficiency (lower cost, quality constant) with which health manpower, particularly nurses, is utilized by the hospital is a very worthwhile problem area.

Dr. Wolf's study tried to get at answers to questions like the following: (1) how does the peer review process operate in relation to cost containment and in relation to patient care, and (2) if the nursing director is on the peer review board, does her administrative knowledge increase; if it does, is this knowledge manifest in relationships with subordinates and in relation to cost and performance?

Well, these were the questions to which Dr. Wolf and his colleagues tried to find answers. In concurrence with the previous discussant, I too think these questions still go unanswered. However, in our continual search for answers to them we can learn from Connecticut's experimental design and from the many research problems encountered during the study as discussed in the concluding section of Dr. Wolf's paper.

The ideas that Dr. Cleland and Mary Lee Sulkowski develop are rooted in social psychology. From their literature review it would appear that considerable agreement exists among social psychologists regarding the point that a woman in the United States today does not engage in (at least during early years) an occupational commitment—job achievement—for her identity and self-esteem. Rather, the latter is found in the woman's role as a wife and mother. Speaking as an economist, I consider the formal development of these theories to be excellent, and I am persuaded to agree with their specific explanation of the work behavior of professional nurses.

In effect, what Dr. Cleland and her colleague are saying is that the supply of nursing resources to society will increase, holding everything else constant, if we can negotiate or bring about a change in the social status of women as they relate to labor market work. In this instance the change being recommended is to broaden the woman's source of identity and self-esteem from the mother-wife role only to that which also includes her role as a professional in the labor market.

If, on a graph, we label age on the abscissa and the labor force participation rate on the ordinate, then for nurses we would see a bimodal labor force pattern develop. The probability of labor force participation would be relatively high during a woman's younger years after college; this probability would decline during her childbearing and childrearing years, and then following these years it would increase until the woman enters her retirement years at which time the probability of labor force participation begins to decline. Dr. Cleland and Mary Lee Sulkowski see the entire distribution of participation rates shifting *upward* if it were possible to, say, create the same labor market role for women as that which currently exists for men. That is, such a change in thinking (roles) would result in more human (nursing) resources being allocated to market work.

This brings me to the last point I wanted to make regarding research currently being conducted by me and a few colleagues like Drs. Stuart Altman, Lee Benham, Jesse Hixon, and Donald Yett. We have been studying the relationship between various measures of nursing labor supply and a number of socioeconomic variables that impact on the former. In general, we have not considered the effects of change in sociopsychological variables (as discussed by Dr. Cleland) on the nurses' labor supply and labor force participation behavior. Rather, we implicitly assume that at a point in time—in cross section—there is little or no labor market role variation among nurses that could account for variations in the nurses' labor market behavior.

This assumption is realistic enough when it comes to cross sectional studies; however, through time, cultural changes do occur and their effect on market work behavior must be taken into account. As an aside, I should note that this is precisely the point where Dr. Cleland's study complements our work in this area. Indeed, one of the positive aspects of this conference is that it has given us the opportunity to gain interdisciplinary insights into a common research problem.

The variables we have used in analyzing the nurses' market work behavior include husband's earnings, the nurse's wage, family size, age of children, and the age of the nurse, to mention a few. I am confident that most of you will find the partial relationship between these variables and the time a nurse spends in the labor market most interesting.

Evaluation of Quality of Nursing Care

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Introduction

In any project to evaluate the quality of nursing care, whether for research, educational, or administrative purposes, those directly responsible for nursing care of patients must be involved. Though it means beginning on a rather negative note, it seems to me that it may serve us to identify some of the difficulties these persons encounter as they are involved in evaluation endeavors. It has been my experience that nurses, of whatever level of administrative hierarchy and in relation to whatever purpose for evaluation, express dissatisfaction with evaluation. They may be very satisfied with all other elements of a program, or various nurses may identify particular areas about which one or another has mild unease, but when evaluation is mentioned there is unanimous expression of dissatisfaction. There is dissatisfaction either with all aspects of the program or, frequently, with the complete absence of a program.

There are four sources of dissatisfaction with evaluation programs in which nursing staffs are involved. Perhaps the fundamental source of dissatisfaction is failure to recognize the magnitude and complexity of the task. The second most basic source is the imprecision with which many inherent terms are used. The third is the failure to distinguish between and to make explicit the reasons and purposes for undertaking evaluation. The fourth is the lack of neatness possible in any evaluation endeavor where human action, interaction, and reaction are involved.

There of course is interrelationship among these, and the sequence of listing is not meant to indicate greater or less importance, except for the primacy of the first one.

Understanding and Precision in Use of Terms

For reasons that will later be clear, I shall begin discussions with the second listed source of dissatisfaction. Among the difficulties in relation to use of terms is failure to define the terms on a level of sufficient concreteness and specificity, in contrast to abstractness and generalization, so that a common understanding is achieved among those using the term. Perhaps the source of greatest difficulty is the interchange of words with similar or closely allied meanings. These are often used as though they had identical meanings in one sentence but had distinctly different meanings in the next sentence.

My protest is not that every word or term had but one meaning or that there are not words having two or more meanings. The point I wish to make is that interchange of words or use of one word for two or more connotations in a single general context frequently presents problems of communication. In most such instances it is possible to designate distinguishing definitions of the confusing terms. Further, it is reasonable to suggest that, in any one context under consideration, each word be used only in its defined meaning, and that two terms, which in other context might have interchangeable meanings, not be so used in the particular context.

For example, of immediate concern to us are the words "evaluation" and "measurement." You may propose that, since their meanings are quite distinct, it is unlikely that these two words would be used interchangeably. Indeed, it is true that their meanings are distinct, but it is also true that persons frequently fail to make the distinction as they use them. A most common phrase, "evaluation and measurement," would seem to indicate that many do not use the terms with precision. The structure of the phrase seems to indicate that individuals do not recognize that measurement is a prerequisite to evaluation.

Delineation of varied usages of terms pertinent in considerations about evaluation and possible reasons for varied usages, along with the accompanying confusions or limitations in communication, would involve detail beyond the scope of this paper. Clarification and suggestions for alleviation of some of the difficulties may be served by defining some of the involved terms, followed by identification of some difficulties in usage. To preclude confusion in the meanings of the various terms employed in this paper, I have included at the back a list of definitions.

It seemed a good idea to start with a definition of definition. Some of the definitions are excerpts straight from Webster. Many, however, are constructed on the basis of logic and fit for the purposes of the context in which they will herein be used. Brief discussion of some of the words seems warranted. For example, recognition of the distinct meanings of measurement and evaluation might well expedite the work in all projects for evaluation. Failure to recognize differences in the meanings of the two terms leads to attempting to begin in the middle or near the end of the process of planning evaluation. Measurements are identified without establishment of a base on which to judge their relevance to the purpose for which the evaluation is to be undertaken.

Standard, and Standard of Measurement

Another area of difficulty derives from the interchange and failure to distinguish between meanings of standard and standard of measurement. Actually, except for the undesirable connotation of average inherent in the concept of norm, it might be well to adopt the use of the term "norm" where ordinarily the term "standard" is meant. The connotation of average is here considered unfortunate because frequently, when standards are set, the intent is that the goal or what is desirable is something above average. The latter does seem to be implied by the concept of standard when it is defined as "a level of excellence." The failure to distinguish among the meanings of standard, standard of measurement, and unit of measurement is frequently observed in nursing literature, particularly where nurses are struggling with evaluations of clinical competence. In almost any article on the subject, there is lengthy description of the various standards of measurement to be used for evaluations of nurses with various levels of educational background.

It is proposed that there be different standards of measurement because the same level of competency cannot be expected for nurses with varied educational preparations. What is meant is that there must be different standards, different levels of competency that will be acceptable, not different standards of measurement by which to ascertain those levels.

I am confronted with these misconceptions repeatedly in relation to the Slater and Qualpacs scales, in which the standard of measurement is "care expected of a first level staff nurse." Those considering use of the scales, whether education or service personnel, ask about changing the standard of measurement in the events of using the scales to measure competencies of nursing students, staff nurses, or clinical specialists. They obviously are unaware of the meaning of a standard of measurement being "an object which serves to define the magnitude of a unit." They fail to distinguish between two concepts:

(a) the concept of *standard*, which denotes an accepted level of excellence and which implies the appropriateness of establishing varying levels of excellence for various levels of student or for the nurse staff with various qualifications,

(b) the concept of *standard of measurement*, which denotes an object that, under specific conditions, serves to define or represent the magnitude of a unit and that, in turn, permits comparable measurement to be made of similar phenomena. It provides the unit of measurement to be used for determining the degree of attainment of an established or accepted standard.

Subjectivity and Judgment

Another difficulty frequently identified by persons considering the use of tools for measuring clinical competence of nurses is concern about subjectivity in measurement. In a way, it seems remarkable that nurses have so much discomfort about the matter of subjectivity and "subjective judgment" in relation to measurements of clinical competence displayed by nurses. This is particularly remarkable in relation to clinical instructors and supervisors. Their whole effort in clinical instruction, guidance, and supervision is aimed toward assisting nurses to make judgments.

The professional nurse's forte is her clinical judgment. In all of her clinical supervision, the instructor or supervisor uses her own clinical judgment to determine when a nurse being supervised is making a correct judgment and when she may need guidance to improve her judgment. This is accepted with no problem. Now let the supervisor redirect her conscious focus away from guidance and instruction and toward evaluation for the purpose of accounting for the nurse's display of clinical competence—a large part of which is professional judgment—and she, and all about her, question the goodness of the evaluation she might do because it is based on subjective judgment! Her use of clinical judgment is accepted without question when she uses it to instruct. But when used to evaluate the results of her instruction, it is immediately something less than satisfactory.

Perhaps it would help if we looked at what the words mean. To judge is "to form an idea or opinion about; to think or suppose." Subjective means "of, affected by, or produced by the mind." Actually, subjective judgment is a redundancy: all judgment is subjective; there is no judgment without subjectivity. All nurse actions stem from judgments. Professional judgment has basis in fact but would be nothing without the catalyst of subjectivity.

Always there is the quest for objective evaluation. Here we have blatant examples of imprecise use of terms: subjective judgment is a redundancy, and objective evaluation is an antithesis.

Evaluation is the term usually used by those expressing dissatisfaction, despite the fact that they are usually talking about subjectivity in the measurement aspect of the evaluation process. Possibly some of the discomfort and condemnation occurs because the denotation of *subjectivity* is used instead of that for *subjective*. The dictionary definition of subjectivity is "The tendency to consider things primarily in the light of one's own personality. Concern with one's own thoughts and feelings." Whereas subjective means "Of, affected by, or produced by the mind." The definition of subjectivity is undoubtedly what leads to the comment: "They evaluate a staff nurse on whether or not they like her as a person."

Might nurses be helped if they were reminded of specifics of what they are really about? That evaluation is a generalization descriptive of a judgment based on many measurements. The measurements are of the nursing care actions of the individual being evaluated. The measurements on which the evaluative judgments are based are not measurements of attributes or qualities of the person. The person happens to be the vehicle for the entities being measured—the performer of the actions. The actions are being measured, not the perfomer of the actions.

Also, nurses might develop confidence from a reminder from Abraham Kaplan when he said, "The new treason of the intellectuals is that we have shared and even contributed to the current loss of faith in the power of the human mind to cope with human problems, faith in the worth of reasoned discussion, faith even in the possibility of objective truth." It seems to me that nurses need to recognize specifically what their concerns are and to have the confidence and courage to know that they are capable of making informed judgments based on observed facts.

Criterion Measures

Another whole area in which nurses neglect to use definitions and precise meanings of words to assist them is in identification of criterion measures appropriate to securing measurements on which to base valid and relevant evaluations. When faced with the need to plan for evaluation, they begin by identifying observations in terms of the overall objective or purpose of the program to be evaluated. They fail to approach the task at even the subobjectives level, not to mention entering at the level of constructing precise definitions of each crucial word in the subobjectives. They seem not to have discovered that detailed specificity of terms can reveal whether an objective, as stated, actually says what those who constructed it intended it to say. They seem not to know that the only assurance of relevant criterion measures' being identified is via detailed and specific definitions.

There I commend to you the process of developing a three-phase definition of the crucial terms where in the first phase is a general or dictionary definition. The second phase is a pertinent general definition—the general meaning of the term in the context of the concern of the evaluators. In delineation of the pertinent general definition, the criterion measures will evolve. The third phase is a for-instance definition, in which an example of a single relevant measurement is described. This process of definition ensures a systematic approach to assurance that criterion measures and actual measurements to be sought will be relevant to the purpose for which the evaluation project is undertaken. The crucial terms to be so defined are those that stipulate the outcomes of achievements of the program to be evaluated.

Failure to Make the Purpose Explicit

The general concept that evaluation is done for the purpose of "gathering information on which to base improvement" is useful as far as it goes. It can be used to serve as a criterion on which to screen potential relevance of observations to be made. But there are other purposes for doing evaluations of quality of nursing care. Among them are quality control, the obligation of accountability, continuing eduation, and determining relationships among a variety of potentially related variables. Here again there may arise difficulties due to lack of clarity about meanings of words.

Reasons and purposes for doing evaluations are sometimes confused. Particular measurements may serve the intents of persons with various reasons for doing evaluations. For example, data that will provide for determining relationships among variables will serve persons whose interest is research, the interests of the therapist, and those of the administrator. Therefore, failure to identify specifically the *reasons* is not apt to influence the quality of the outcomes of evaluation.

On the other hand, the *purpose* for which the data will be gathered must be made explicit, if data germane to the purpose are to be obtained. For example, if the purpose for evaluating outcomes of a new procedure is to determine its effectiveness in preventing skin breakdown, the data to be gathered will be rather different from those gathered should the purpose be to determine the numbers and mix of staffing required to perform the new procedure as recommended for a set of patients.

Other factors alluded to earlier as encompassed in this broad area of difficulty, failure to make purpose explicit, may be considered under the three-part framework for evaluation of human action programs: structure, process, and outcome. When planning evaluation of quality of nursing care it is essential to be aware of what, specifically, is to be measured. What is to be measured, of course, is identified in the declaration of the purpose for doing the evaluation. It is conceivable that a particular purpose would dictate measurement of all three components of care: structure, process, and outcome. If this is the case, the planners should be fully aware of the intent. They must also approach the task with definitive plans for measurement of each of the components. This awareness and approach will ensure cognizance that few, if any, evaluation projects can be accomplished through utilization of a single tool or procedure for gathering data.

Lack of Neatness

The impossibility of accomplishing an evaluation of nursing care with a single procedure or instrument of data gathering is part of what I mean by the lack of neatness of the process. If nursing care were unidimensional, if there were an established standard of measurement for this dimension, if there were a validated, scaled instrument for making the measurements, evaluation of nursing care would pose few if any difficulties.

But nursing care itself is multidimensional. There is no consensus about what many of the dimensions are, not to mention consensus about standards or units of measurement for them. When evaluation is considered there will be concerns about the various facets of care, such as the process of care, the setting and a situation of care, the attributes and qualifications of persons administering care, and the outcomes of care in terms of time and efficiency and in terms of welfare of the patient.

These and many more factors make for lack of tidiness and directness in the accomplishment of evaluation of nursing care. Perhaps the most important element in alleviation of these difficulties is the recognition and acknowledgment of their existence. The recognition of them and the nature and influence of each should lead to organization for orderly approach to the task of evaluation. They should lead to effective and efficient sequencing of the components of the total task.

Failure to Recognize the Magnitude and Complexity of the Task

There was reason for elaboration of the other sources of dissatisfaction with evaluation projects before addressing the failure to recognize the magnitude and complexity of the task. Essentially, facets of the other sources as elaborated identify and describe components of the task. For example, there is the need to make explicit the reasons and purposes for doing the evaluations, the need for precise definitions of terms in order to reveal both the accuracy or lack thereof of the identification of objects to be measured and the criterion measures relevant to them, and the determination of the precise data germane to the purpose to be served by the evaluation.

There needs to be recognition that much hard thinking and planning must be done. Many decisions must be made before any data are collected, and many and varied data must be gathered and organized. In turn, further hard work of thinking and decisions must be done before evaluative statements can be delineated, before there will be information to serve as bases for change, to fulfill the purpose for doing the evaluation.

Since research in evaluation of quality of nursing care must involve those directly responsible for the nursing care of patients, the researcher who is cognizant of the difficulties experienced by the nurses and who assists them to understand and cope with them will advance his investigation and incidentally will assist nurses with an important administrative task.

Where—In Evaluation of Quality of Nursing Care

Variables of primary concern to investigators of nursing care of patients are those composing the structure, process, and outcome of patient care as described by Donabedian. The ultimate concern is the relationship of all other variables to those identified as outcomes of nursing care. In this context, all other variables—staffing, facilities, philosophy, policy, staff performance—are causal variables. Outcomes—patient well-being, patient improvement—are effects variables. It is within this broad framework that research in evaluation of quality of nursing care must be pursued.

Historically, research in evaluation of nursing care has progressed along a continuum of the concrete to the more-or-less abstract. There have been successes in development of measurements of structure: numbers of persons, time, facilities. Among them are the "how to" techniques and instruments developed by the Division of Nursing during the 1950's and early 1960's: how to study nursing activities in a patient unit, how to study nursing service in an outpatient department, how to study nursing supervision, and others.

There have been successes in development of measurements of process: nurse actions, interactions with and interventions on behalf of patients. Among these are three developed by the faculty of the College of Nursing, Wayne State University:

(a) Slator Nursing Competencies Rating Scale, for measuring competencies displayed by a nurse,

(b) Quality Patient Care Scale, for measuring the quality of nursing care received by a patient while care is ongoing.

(c) Nursing Audit, for measuring the quality of nursing care received by a patient after a cycle of care has been completed and the patient discharged.

These three instruments and suggestions for their uses, have been described in some detail in an article in *Hospital Topics,* August 1972. And there have been beginning studies to develop measurements of outcomes of nursing care.

There must be continuing work in all areas along the continuum. But it does seem to me that we have reached a point where a concerted effort is warranted in the area of measurement of outcomes of nursing care in terms of patient well-being.

All of the comments about difficulties in evaluation apply here. Some of us have wrestled with the ideas of the magnitude and complexity of the task. We have faced the need to define some of the terms. In these attempts we ran into problems of making explicit the purposes for evaluation: Whose purposes are to be of concern? During a conference last fall, a group of us recognized and reconciled ourselves to one difficulty: the task of measurement of outcomes of nursing care will not be accomplished through development of a single measuring instrument.

Recognition of the magnitude and complexity of the task should be sought, not as an excuse for immobility but rather as a caution that the task cannot be approached all of a piece. Progress to date has been made by individuals and groups isolating single facets of the larger task and pursuing information about each. It may be expected that continuing work will follow that pattern but always with the plea for increased communications among the seekers. Communications will promote the work on individual projects and preclude unnecessary overlap or repetition.

The goal to be sought through research in evaluation of quality of nursing care must be capability of determining relationships among variables of structure, process, and outcome. There are available to us, not finished or perfect but usable, measurements of the first two. There are some measurements identified as potentially usable for the third area. But it seems to me we need to recognize the magnitude of the task and proceed in a systematic fashion by beginning with determination of criterion measures of outcomes of nursing care. The criterion measures must be delineated in terms of patient well-being.

Work has begun. There is extensive time and distance to go, but the beginnings have been made and the direction is discernible.

Definitions

Definition.—An arbitrarily imposed description that allows common understanding.

Evaluate.—To ascertain or fix the value or worth of.

To examine and judge.

Evaluate implies considered judgment in setting a value on a person or thing.

Measure.—To ascertain the dimensions, quantity, or capacity of.

To mark off, usually with reference to some unit of measurement.

Evaluation.—A generalization describing a judgment based on many measurements.

Evaluation.—A process by which we gather information as a basis for improvement.

Quality.—A characteristic or attribute of something: excellence, superiority, degree or grade of excellence.

Standard.—Something used by general agreement to determine whether a thing is as it should be.

An agreed upon level of excellence.

An established norm.

Measurement.—A comparison of a single phenomenon with a standard of measurement: the recorded number or symbol that represents the magnitude of the phenomenon in terms of the magnitude of the standard of measurement.

Standard of judgment.—An object which, under specific conditions, serves to define, represent, or record the magnitude of a unit.

Unit of measurement.—A precisely defined quantity in terms of which the magnitude of all other quantities of the same kind can be stated.

Judge.—To form an idea or opinion about (any matter).

To think or suppose.

Judgment.—The mental ability to perceive and distinguish relationships or alternatives; the critical faculty; discernment.

The capacity to make reasonable decisions, especially in regard to practical affairs of life: good sense, wisdom.

Subjective.—Of, affected by, or produced by the mind or a particular state of mind.

Of or resulting from the feelings or temperment of the subject or person thinking, rather than from the attributes of the object thought of; as, a subjective judgment.

Subjectivity.—The tendency to consider things primarily in the light of one's own personality. Concern with one's own thoughts and feelings.

Objective.—Of or having to do with material object as distinguished from a mental concept, idea, or belief.

Having actual existence or reality.

Uninfluenced by emotion, surmise, or personal prejudice.

Based on observable phenomena; presented factually.

Measurement.—An objective term: the ascertaining of a dimension through observation of a phenomenon.

Evaluation.—A subjective term: the ascertaining or fixing of a value through considered judgment.

Criterion measure.—A quality, attribute, or characteristic of a variable that may be measured to provide scores by which subjects of the same class can be compared in relation to the variable.

Variable.—A measurable or potentially measurable component of an object or event that may fluctuate in quantity or quality, or that may be different in quantity or quality from individual object or event to another individual object or event of the same general class.

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DISCUSSION OF DR. WANDELT'S PAPER

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In all the definitions that are given, there is no definition of quality. During the past day and a half, whenever we have talked about quality of care, values and value systems have been reflected although no one has made them explicit. Many of the arguments about what should be studied as indicators of quality of care arise from conflicts in values. We would do well to make the value systems that underlie our selection of criteria for judging quality explicit.

One problem with giving definitions is that you always want to start haggling with the definition. I do not want to start haggling. However, I am going to use the phrase "criterion variables" because one of the immediate problems is to identify the variables that are relevant indicators of quality of care and then to talk about how to appraise those variables.

We ought to make a clear distinction between the term "criterion variable" and the term "standards." Theoretically a criterion variable can and should have a range of values from low to high. Standards imply that you are seeking some definite value or score on a particular variable in order to say the performance reflected by the variable is at least satisfactory or adequate.

The three terms "structure," "process," and "product" that Dr. Wandelt used are creeping into the literature on evaluation in the health care area. I believe these terms were first used in a paper by Tyler in 1931. He used the three terms to describe levels of evaluation in education. He pointed out that most of the evaluation of quality of education was in terms of structure, the conditions under which education takes place, or of process, how the education was being conducted. The product or outcomes of the educational process, according to Tyler, were rarely appraised because they were believed to be too difficult to measure. Tyler criticized people for assuming that because certain structures or processes were present the desired outcomes must be present. We know that the assumed high relationship between process or structure and outcomes in education does not exist, but in education we still have most of the emphasis placed on structure and process and too little on outcomes. I am bothered when I see the health care field repeat the mistakes of educational evaluation. Although the three terms may be useful in classifying variables used to judge quality of health care, they do not provide an adequate framework for studying quality of health care.

To make progress in the evaluation of health care, perhaps we should stop asking the global question, "What is the quality of nursing care?" and start asking more specific questions. The more specific question will permit better identification of the value system being used and will provide a better frame of reference for judging the relevance of criterion variables than will the global question.

A number of frames of reference can be used to study nursing care or, if you prefer the term, quality of nursing care. One frame of reference could be what the profession of nursing would like the practice of nursing to be. If you could identify what professional nurses deem to be "good practice," you could appraise the extent to which the practice matches these expectations. Or if you could identify the conditions necessary for delivering what is considered "best nursing practice," you could appraise the extent to which these conditions are present.

A second frame of reference that could be used to appraise nursing care is patient outcome. To ascertain that nursing practice is congruent with professional expectations of that practice does not guarantee that desired patient outcomes are present. Although no one would argue that the expectations of the profession concerning the desirable practices of nursing are set without regard to what happens to the patient, we have very little hard data on the relationship between nursing practice and patient outcomes. To focus too much attention on practice and too little on patient outcomes might result in the methods of practice becoming ends in themselves or being used more for the benefit of the profession than for the benefit of the patient.

A third frame of reference that could be used is consumer or patient expectations of the health care or nursing care system. This frame of reference differs from the second one mentioned in the previous paragraph. In the latter, patient outcomes are judged by the health care professional in terms of what the professional wants to achieve with the patient in terms of his health or well-being. In other words, it is the extent to which the status of the patient meets the expectations of the health care professional.

In the third frame of reference, it is the extent to which the status of the patient meets patient expectations or the extent to which the service meets patient expectations for that service. Patient expectations may be reasonable or unreasonable in the eyes of the professional; however, they are very real to the patient and cannot be ignored in the appraisal of any health care system.

Mr. Gardiner

I have simply a set of questions that hopefully will provoke some response. First, is it not likely that points at which we make measurements of quality go a long way toward determining what ends up being defined as quality? We can measure it either at the input level of the process or at the output level. If it is measured at the output level, are we not measuring the ability of the professionals to carry out their tasks; not whether, in fact, the tasks are carried out, but whether they have the ability to carry them out?

We have said the psychological social needs of the patient are critical toward an evaluation of quality. I suspect this is equally true of the psychological social needs of the nurses who respond to changes in the level of staffing. This is, in fact, equally as important in their view as the quality of care that they provide.

At the output level, we are judging the ultimate effects in the patient's welfare or well-being. Does he recover? Does he recover sufficiently, or to what degree does he recover? How long does he stay recovered? It may be that we need to consider the relative costs and benefits of taking measures at any of these points to determine where we ought to focus our attention. Where do we want to begin measuring to define quality?

Why measure? That has been alluded to. Is quality relevant to changes in staff? Harvey Wolfe asked the question and I think it's a good question. At least two things indicate that if we are looking at quality simply as a reflection of marginal or small changes in levels of staffing, maybe the staffing can be done independently and we do not need to examine quality.

First, under crisis or stress situations (short staff), the quality of care delivered to the sickest patients probably remains a great deal different from the quality of care delivered to the patients who are not as sick. Do changes in staffing levels have an effect on the ultimate outcome? Not how the patient perceives he's being treated or how the nurse feels, but does it have an effect on the fact of recovery? Second, are there not sufficient episodes of illness that are, themselves, self-limiting? That is, will the patient get better despite the quality of nursing care delivered?

That seems to beg the question of why we want to measure quality. If we want to measure quality for purposes other than staffing, it seems to be relevant. Is it relevant for evaluating the effects of changes in staff, at least marginal changes in staff? Moreover, can the quality of nursing care be considered independently of other aspects of quality of care, the quality of medical practice, the quality of the ancillary services and all the other services that are provided in the health care system? Don't we have to decide a priori what the cost benefits are or at least estimate them to determine what aspects of quality we want to investigate and what we want to measure?

These are all considerations that must be undertaken if we are to perform a realistic measurement of quality of nursing care.

Psychosocial Factors in Hospitals and Nursing Staffing

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Introduction

In preparing this document I am only too aware of our general ignorance of the psychosocial factors that influence the behavior of those who serve complex human institutions. After a year as rapporteur general to a group of management experts nominated by the governments of the Organization of Economic Community Development countries to study the relations between management and labor across the industrial world, I am particularly aware of may own ignorance.

In 1964 I concluded that hospitals are institutions cradled in anxiety. In consequence, the most urgent task of nurse administrators and all others upon whom they rely is to ameliorate this anxiety. No research work since that time has modified this conclusion, although much has been done to suggest how the anxiety may be tempered. Since the anxiety varies significantly from one hospital to another and even from one ward to another in the same hospital, it is clear that anxiety is significantly a product of the local situation. It follows that only changes in the local situation are likely significantly to affect anxiety, however desirable more general measures may be to improve conditions throughout health services as a whole.

One way of changing a local situation is by administrative surgery, transplanting the person in charge. But like surgery carried out in other contexts, many subtle equilibria may be disturbed that were neither forseen nor even understood. I have therefore relied in this paper upon the blander resources of administrative and managerial psychotherapies. To what extent can we treat the anxiety situations as offering scope for learning? What are the conditions under which the daily work, however charged it may be with anxiety, may become a process of autonomous development, of learning by doing, of social reinforcement?

I give here two sets of illustrations from activities in and around London. One set offers the results, good and bad, of what was called the Hospital Internal Communication (HIC) Project. The other describes a series of discussion groups among nurses of all grades from matrons to students at the King's Fund Hospital Centre.

Earlier Studies

A number of us at the University of Manchester, Manchester, England, did research on what began as a study of nurse wastage, or dropouts among girls who were qualifying to become nurses.

Manchester is the largest city in industrial Lancashire. When the Industrial Revolution took place it left behind it in Lancashire 14 towns that, with the exception of Manchester, are all about the same size. They are all identical; the same percentage of people do all different kinds of jobs. The ratable value for head of population, community tax inhabitant is remarkably similar. So we have 14 separate towns scattered around Lancashire that are more homogeneous than any other 14 towns that you can draw anywhere.

We had thus assembled 14 ecologies that are distinct but identical. In each of these was a hospital. We therefore decided we would examine the structure of these hospitals, their metabolism rather than their anatomy, to determine how successful they are in digesting those who enter them, both nurses and patients.

Researchers in the extremely homogeneous environments of the Lancashire towns suggested that hospitals with serious nurse staffing problems had difficulty in retaining all grades, not student nurses alone. If the senior staff and ward sisters were stable, so were the nurses in training. In like manner, instability reflected itself down the line from senior staff to nurses in training. Again in this homogeneous Lancashire sample, hospitals with stable nursing staffs seemed to have short lengths of patient stay. A stable staff seemed to make for efficient patient recovery.

It was suggested that the hospital factor that significantly accounted for this relation of effectiveness to stability was the quality of the human contacts within the hospitals. These contacts are of two kinds, factual and emotional; both are important. A nurse may need to know something about a patient's treatment and so have need for factual guidance. She may be afraid to ask for such guidance and thus need emotional support.

When we tested these suggestions in the actual study we found some interesting results, and I believe subsequent research is beginning to suggest the results we found there are probably universal. The hospitals we could compare were similar in size and age and set in identical semblance of surrounding population. The resulting comparison of like with like showed conclusively that hospitals that could keep their nurses, the student nurses, could also keep their senior nurses. Even their matrons stayed longer, and this was also associated with a short length of patient stay. The hospital with a highly stable nursing staff discharged their patients most quickly.

We examined this in many details. We found, for example, that hospitals with short length of patient stay had very short waiting lists. You would think patients go through the hospital quickly because many people are waiting at the door to take their beds. But that isn't so. The hospital that discharges patients quickly has a short waiting list. As the operations research people know, if the stay time is short the mean time of waiting is small.

This led us to examine very carefully a sample of five hospitals. We examined them in great detail. We asked what ward sisters did. The head nurses, as I think you call them, seemed to us to be the key people in the system. We examined the communication patterns of these hospitals. It was clear that the causative variables that explained staff stability and patient recovery were very closely connected with the intelligibility and friendliness of the communication inside the hospitals. We actually established methods of measuring what communication was.

There is not only the dimension of fact but also perception, anxiety, fear—call it what you like. My thesis was that if we could improve the general level of communication in hospitals we might do two things: improve staff stability and reduce length of patient stay. This was the hypothesis that appeared in the published report, *Standards For Morale*. I tested it outside of Lancashire by examining 15 hospitals all over the United Kingdom: Scotland, London, Yorkshire. We found high concordance among five things.

One was the communication between the ward sister and the power structure; how approachable the ward sister thought the doctors, the matron, and the administrator were. What the clarity of communication was down from the ward sister to the nurses and the patients was another consideration. We measured both of these in the 15 hospitals.

We also measured the average length of stay of all qualified nurses in the 15 hospitals. We compared this with the mean period of discharge of surgical and medical cases for a limited number of rather simple, straightforward, uncomplicated cases like asthma bronchitis and pneumonia. Our hypothesis that good communication was in some way associated with staff stability and patient stay was borne out and confirmed when we shifted away from the Lancashire semblance.

All of this appeared in *Standards For Morale*. King's Fund Hospital Centre of London thought it a good idea to follow up some of the statements made in *Standards For Morale*. The thought was that improved communications could improve the attitudes of staff and the effectiveness with which the hospital is run.

It was the view of the author that the improvement of human contacts, both factual and emotional, both operational and personal, was best achieved by action and responsible cooperation in efforts to understand and to improve those contacts where they existed. Since the HIC Project started such attempts to improve human experience, the term "action-learning" has been introduced. This dual nature suggests that to understand a proposition one must be able to apply it in practice.

The HIC Project

We persuaded 10 hospitals to join a consortium. The experiment design was straightforward. We chose from each hospital two teams of three people. The senior team included the nursing superintendent, the chairman of the medical committee (senior doctor), and the hospital secretary-treasurer.

The junior team consisted of an assistant to the matron of some order, a deputy matron or a senior departmental sister, the hospital secretary-treasurer, consultant, (but normally he was a registrar, the level below the consultant).

For the senior team, the top three, we ran a 3-day conference. We talked to them about the nature of internal communications in hospitals as we then understood them. We got together to talk about their perception of how the hospital held together as an organism, what the network of communication was that turned a large mass of people into a staff. What was it about the hospital that gave it this quality of nurse stability or length of patient stay that discriminated that hospital and other hospitals?

Looking back on it, I can see we spent far too short a time working with these people, the top three people at the hospital. But the junior team spent a month together in a hotel at Hastings, and there we tried to go a little farther. We tried to give them a smattering of methodology: how to conduct an interview, to draw a flow process chart, to design and score a questionnaire. They interviewed each other to practice their skills of wheedling information out of people, measuring opinions. And during that period we sent them to work for a week in a hospital other than their own.

During that week they tried to put into practice some of the skills, the efforts, the practices, the techniques that they had learned while at the seaside and tried to identify within a week what seemed to be the problems of communication within their host hospitals that gave the hospitals most concern.

When they came back we had further conferences. Each of the receiving hospitals had been acquainted by its visitors with what seemed to be the outstanding problems. The receiving hospitals chose particular projects that they would work on with their own team. For the next 3 or 4 years these hospitals among themselves selected quite a large number of projects that they worked on, sometimes with the advice of the teams that had visited them in the first place, sometimes with the help of a small team that I assembled at Guy's Hospital. Much more frequently they worked with the help of students of sociology, nurses in training, all kinds of people, university students who intended to be nurses or who were interested in the sociology of hospitals. A very large number of people lent a hand with the study of what was going on in these 10 hospitals.

The Problems of Perception

This direct invocation of the psychosocial genre of the hospital turned out to be the most evasive and uncertain departure. A large number of persons at all levels of responsibility in the hospitals and, indeed, in the central research team guiding the project, confessed that they never understood what it was trying to do. Only when a group of persons at a hospital really determined to see what they could learn of their problems by energetically tackling them did the mission of the project become clear, both intellectually and emotionally.

Such, of course, is true of all psychosocial phenomena. There must be some leaven to energize the lump. Even reviewers of the books that have appeared about it say its aims were never made clear, despite the fact that these were set forth in writing for all to read. A résumé of the aims of the HIC Project is attached as appendix I. Such action-learning projects have since been started in many other places, mostly outside of Britain. In appendix II the responses to such efforts in an American university are analyzed and should be helpful to those concerned with action-learning in hospitals.

Now, what did this effort actually achieve? I think it is fair to say that where from the outset the senior team in the hospital believed in the goals of the project, then the results were highly positive. The attitudes of the staff were favorably changed and the project on which they worked achieved much of what it set out to do. Where there was no confidence, where there was skepticism from the start, then very little happened. Sometimes in the course of the study, the persons concerned—doctors, nurses, and administrators—were converted. They saw what these notions on communication really meant when they themselves became engaged in it.

The union of these ideas in studying communication in this sense and the scientific operational research development have produced quite a remarkable result. Where people had become involved and were expected to contribute ideas to the solution of the problems, two things happened: their attitudes toward the hospital as a whole improved, and the system itself improved.

They improved the communication system at the level of attitudes. They improved it at the level of operations. They found that if people became operationally involved in attempting to improve the system that was giving them anxiety, they could, in fact, improve the system and they could change attitudes toward the institution.

Psychological Factors

"... the feeling of people concerned with this study has been that a happy hospital is the best guarantee of a nurse completing her training. The practical problem is to achieve this by attention to the difficulties that beset sisters and the sisters' attitudes to the junior nurses, by providing efficient nursing management, by helping the nurses to organize an adequate social life, and by arranging support for the nurses when they have emotional problems. Some of these are easier to do than others, but a start has been made with all of them... (*1*)."

Here, in less than one hundred words, is the substance of this paper. More fully, it describes a series of efforts, made both within hospitals and outside them, to identify, understand, and resolve some of the human problems bedeviling the provision of patient care. Whether the results that flowed from these efforts were promising as well as meager, or whether they were simply meager because the approach was misconceived, is a matter of opinion. The efforts were either part of the HIC Project or part of a series of monthly discussion groups organized at the Hospital Centre for nurses from hospitals in and around London. Both of these efforts were strongly supported by the King Edward Hospital Fund for London and the first by the Ministry of Health.

Some Illustrations of Psychological Development

"Our results indicated that the attitudes and opinions of the nurses in the ward and those of nurses in charge of wards are closely connected. Without a doubt, the attitudes of the nursing administration, in turn, have some effect on ward sisters and charge nurses. We attempted not only to alter procedures and attitudes at ward level but also to involve the senior nurses more closely, hoping for some modification or change in the upper levels of nursing hierarchy. These nurses were involved in at least 30 meetings to discuss different aspects of their work. These became increasingly uninhibited and healthy. At two meetings held with HIC team members to discuss the whole project with especial reference to the senior nurse's involvement, many nurses spontaneously said that the meetings helped them to reflect on their own ideas and attitudes. Some gave examples of how they had attempted to overcome problems in their particular areas, indicating some changes had occurred. How far attitudes changed throughout the hospital could be assessed by repeating the survey in the future (*2*)."

We give in this section a few illustrations of how the involvement in action-learning studies seemed to those at the cutting edge of the hospital system. The examples are in the alphabetical order of name of the hospital from which they are drawn. The first was written by the matron and her deputy at Edgware Hospital.[1]

Accident and Emergency Department

In response to complaints received about the accident and emergency department, many of them apparently justified, the HIC decided to investigate. Finding that the casualty department and the casualty theatre were controlled by different heads of departments (one of whom was about to retire) with followup dressings controlled by a third, the team decided to perform an in-depth study of the problems, conducted in a way calculated to involve all grades of staff in the department.

The team's objectives were as follows:

(a) to provide a comprehensive casualty service despite the physical limitations of the department,

(b) to establish continuity of treatment and patient care,

(c) to provide an improved practical comprehensive training for student and pupil nurses,

(d) to reduce patients' waiting time to a minimum,

(e) to enhance the public image of the hospital.

Following detailed explanations of the survey by the HIC teams, comments by department staff members were solicited and 1,750 of these were recorded in 38 interviews. When agreement had been reached as to organization and as to physical or structural problems, these were referred to the responsible administrative, medical, or nursing policy makers for action. In subsequent meetings with HIC team members, many solutions were contributed by the staff and were put into practice immediately. Redeployment of staff resulting from this has not only improved patient care but has provided an improved training atmosphere for student and pupil nurses. Nursing responsibility has been more clearly defined, and discussions have been initiated concerning medical and nursing policy and procedure. A great deal of the success must be attributed to the fact that the chairman of the hospital subcommittee gave her support throughout the study, attending many feedback meetings and several presentations by HIC teams of other hospitals participating in the project.

There are several outstanding items of interest in this account. First, the impending retirement of the head of the department offered the *opportunity* to change the system. Second, the exercise was planned both to *modify a system and train the staff*. Third, from the very outset it was seen by the subordinate staff to be *supported by those in established positions of power*. Fourth, the meaning of the term *"communication"* became clear only after vigorous efforts had been made to improve it.

Hillingdon Hospital (3)

"My own view, for what it is worth, is that the HIC Project suffered from too much pressure to produce results by its techniques, when in the hospitals there may have been more pressing problems that had to be solved by other methods. This, I believe, was the case at our hospital where, during most of the project period, we were concerned with the overriding task of completing, equipping, moving into, and commissioning the new hospital building. It is only since the move has been completed that we have begun to use HIC techniques to solve a real problem, the one concerning nursing staff described by my colleagues.

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[1] Vick, Pauline, and Merchant, Barbara. "Study of the Accident and Emergency Department." *Hospitals: Communications, Choice and Change*, 1972. The following account is taken entirely from this chapter.

"There was a lack of definition of the purpose at the Hastings course. It seemed to be a collection of interesting lectures with an insufficient central theme. I believe that the hospital people on the course could have contributed more by cooperating with the research workers in devising ways in which communication in hospitals might be improved, and I think too much emphasis was placed upon demonstrating the connections between poor communications and other short-comings at the expense of not devoting sufficient time to devising practical means of improving matters."

These are entirely fair and constructive criticisms of a poorly timed effort to use what might in other conditions have been reasonably successful. A major upheaval may not necessarily be the best time to try out new methods of treating old problems. The *opportunity* so apparent in the previous example was missing here. Indeed, the move into new premises is seen as countereffective. Another hospital reported that the same pressure was both necessary and constructive.

"One other aspect of the central team's role has been of great importance to all teams. This was the pressure exerted on hospital teams to report back on their activities and progress. Without this added stimulus many of us would have done very little, especially in the early stages. We still remember that after the training course at Hastings we were expected, within a couple of months, to state our intentions for the future. How many teams would have *any* future had we been allowed to proceed at our leisure (*4*)?"

This, contrasted with the previous extract, emphasizes the profound differences of perception that can arise between colleagues engaged in similar missions. The lesson for the psychotherapist is to choose well his occasion. Finally, the objection made by Mr. Bardgett that the Hastings course lacked definition of purpose runs through many commentaries. As is shown in appendix II, it is a very general objection. But we note that the staff at Edgware Hospital grasped what communication meant when they tried to improve it. There is, unfortunately, no royal road to explaining it in advance. Our next illustration makes the point more clearly.

The London Hospital

This was the only teaching hospital among the 10 in the HIC Project. It is marked out as having its own research units, including one to promote operational research within the hospital itself. It is a unit with a wide reputation and, for example, is lending its computer to the researchers into the services for the mentally handicapped.

Mr. Michael Fairey, the deputy house governor of the hospital and author of most of the section of the report concerning the London Hospital, at the outset shared Mr. Bardgett's confusion as to the objectives of the project.

"The hospital first became aware of the HIC Project through the King Edward's Hospital Fund for London. It is difficult to say what members of the team expected of the project, since its purpose was not entirely clear. It might well be that this was because they were not able to attend the two briefing sessions held at the beginning of the project. The mystery was not noticeable dispelled during the progress of the month's course at Hastings where a similar confusion was apparent. Members of the team formulated a working hypothesis that the aim of the project was to instill methods by which to perceive and study problems within a large organization, and that the success of this attempt would be evaluated. In that event, this hypothesis proved to be not too far from the truth."

At least one person has given a lot of thought to the implications of these lines, and their lesson has been well marked for future applications of action-learning. The project chosen at the London Hospital aimed to improve the emergency admission of patients.

It is of great interest that the London Hospital should have tested the hypothesis underlying the entire project, that responsible involvement in the identification, analysis, and treatment of perceived problems should lead to changes of general attitudes towards working in the system manifesting the problems. In the words of the hospital's own report, "There were highly significant changes in attitude in all those areas where alterations to the system had been made. In marked contrast, in the one area where no changes had been carried out . . . opinion remained remarkably stable."

North Middlesex Hospital

The report of Mr. Alderson, the assistant group secretary at this hospital, shows the difficulties that confront those who try to stimulate action-learning projects for the first time without being able to illustrate their goals with visible evidence of success elsewhere.

"Perhaps the outstanding feature of both our earlier studies was the general lack of enthusiasm on the part of the staff concerned, combined with

. . . Perhaps what we need, to achieve greater staff participation, is the completion of a survey showing tangible proof of success, for it is on results that are of obvious and lasting benefit that the majority of staff judge our efforts in this field. . . .

"So although our use of HIC methods has not been very extensive, we are not entirely disenchanted, but would prefer not to undertake more than we can cope with, even though the help of experts is at our disposal. As to the future, we have hopes of being able to continue to do something to meet staff wishes in the catering field, and there are plans for a small departmental project upon which our thoughts have not yet fully crystallized.

"Beyond this, we shall continue along the path already mapped out, but perhaps with diminished enthusiasm and no longer any great belief in the theory that a problem has only to be evaluated to be solved."

Mr. Alderson was not alone in his views. Dr. G.S.A. Knowles, the senior medical member of the team, had equal difficulties.

"I must admit that I joined the project with considerable skepticism. The stream of verbiage emanating from the central team overwhelmed me both quantitatively and qualitatively, and it did not matter how often I read it, I still did not understand it properly; the individual words had meaning, but when strung together, they communicated little. . . .

"As far as I am concerned, there have been few positive results to get excited about so far. Staff of all grades tend to be uninterested or suspicious. Unless there is some money available to make the necessary changes that are suggested by an investigation, further effort is a waste of time."

Dr. Knowles speaks here for a large number of his colleagues, for many senior nurses and, presumably, also for a majority of hospital administrators. The problem of convincing senior members of the staffs of institutions, without immediately relevant evidence, that their everyday operations can be seen as learning projects may prove insoluble. Without such belief no opportunity can be engineered to give the hypothesis the more-than-favorable launching that it will always demand.

Severalls Hospital

We have quoted from the report of this hospital at the head of this section. Mr. D. J. Dean summarizes the total experience. "Not all of those associated with the project felt able to contribute or become involved to any great extent. Much of the workload fell on one or two members together with a university student. For the efforts of people involved in such a project to be successful, it is essential that they not only feel themselves to be a team but are seen as a team by the hospital as a whole. For this reason the initial stages of preparation are of crucial importance.

"If this form of management is to succeed, the hospital managers must be fully conversant with the ideas behind HIC and be involved fully in any projects that are undertaken."

The physician superintendent of this hospital, now at Rochester, New York, helps to clarify what the HIC Project should have done and very much in terms of psychosocial factors in nursing.

"Communication occurs in two principal forms:

(a) *Propositional* facts and propositions are transmitted,

(b) *Emotional* feelings and attitudes are transmitted.

"I hope the Hospital Internal Communications Project will highlight for readers the importance of *people time*—the way people's opinions are listened to and dealt with or ignored the way their feelings are ruffled or respected—thus producing the enthusiastic and willing worker or resulting in the sour deadbeat.

"*Object time*, on the other hand, is time that is spent dealing with things, and although accountants, carpenters, and committees can deal with material things easily, they concern a separate dimension of hospital function and, when the chips are down, the least important one.

"If the simple platitude that minds matter and people count is again emphasized and if a more reasonable approach to the happiness and well-being of staff and patients is observed, then this study will be most worthwhile and my own support for it well rewarded."

West Middlesex Hospital

The team at this large hospital tackled more problems than did the teams at any others and made a valiant effort to get to the heart of their serious problems of nurse staffing.

"At the inception of the HIC Project we were undergoing a testing time over certain nursing problems, and like everyone else we were short of nurses. This provided a powerful stimulus to ameliorate the lot of junior nurses, a first move we believed, in reducing nurse wastage. . . . The topics discussed by the nurses emphasized their preoccupation with the hospital environment; they fell into six main categories: • lack of social life and activities, • defects of communication, • personal problems, • professional matters, • patients, and • simple administrative deficiencies. . . .

"Interesting manifestations were observed in the groups. Young girls in their first year of training discussed in a mature fashion defects and deficiencies in the hospital that affected their lives, and although they felt strongly about some of their complaints, they discussed them with moderation and insight, showing an impressive perception of the hospital structure and of the feelings of their superiors.

"On the other hand, sisters and consultants, even those taking the nurses' discussion groups, were seen as unapproachable outside the groups. It was evident that during their training many nurses rapidly developed feelings of resignation and hopelessness about the possibility of changing anything, or of obtaining redress, and these feelings were principally responsible for our scheme not being conducive to personal counseling.

"At the discussion meetings, the feeling of people concerned with this work had been that a happy hospital is the best guarantee of a nurse completing her training. The practical problem is to achieve this by attention to the difficulties that beset sisters and to sisters' attitudes to the junior nurses, by providing efficient nursing management, by helping the nurses to organize an adequate social life, and by arranging support for the nurses when they have emotional problems. Some of these are easier to do than others, but a start has been made with all of them."

Conclusion

Such, then, are some perceived results of the HIC Project. They suggest that, given the interest and support of those in positions of authority, the nurses and other staff within the hospital system may work together to improve both the functioning of that system and their attitudes toward their work as a whole. We shall see that the concept of autonomous learning, or of self-development from the group examination and discussion of one's own problems and progress, whatever attention it had attracted in the past, still deserves to be more deeply developed as a form of psychosocial therapy.

A Question of Attitudes

During the 1960's the interest in the human problems of British hospitals was heightened by the publication of a number of critical books, some of which were widely read. Following one of these, *Sans Everything*, a group of people at The Hospital Centre of the King Edward Hospital Fund for London agreed to stage a series of discussion groups for nurses from both general and psychiatric hospitals in and around London. The aims of these were suggested in the following paragraph from a report of the East Anglian Hospital Board.

"It may not be an over simplification to state that the care of patients in hospitals . . . hinges on the two main factors. The first is the nature, quality, and amenities of the accommodation they occupy, and the second is the morale of the staff, involving as it does their personal attitudes towards patients in their care. The latter is the more important, but inevitably it is influenced by the former."

We may observe in passing that all researchers into the subject have revealed highly significant differences, among otherwise comparable hospitals, in the measures of their nurses' attitudes towards their work. It is the existence of these differences that suggested the HIC Project. Cannot a process of organizational learning be set in train so that, in the hospitals with the less favorable attitudes, something is done to correct the conditions out of which they arise? The group at The Hospital Centre was less ambitious and confined itself to organizing a series of monthly discussion groups, eventually spread over 4 years, that gave hospital nurses of all ranks the opportunity to discuss their problems and to give each other support in ameliorating or enduring them.

The original invitation to join the group had in it these words: "There can be little doubt that the attitudes of nurses towards their patients and towards those with whom they work are an important element in the standards of patient care achieved. Very little is known about the nurses' understanding of their patients' needs, nor do we know enough about their reaction to the day-to-day problems of ward administration as it affects patients and staff."

The discussions set out to develop both understanding and knowledge. To what extent they succeeded is hard to define, as responses were more than contradictory. A rigorous attempt to measure attitudes during and after one series of seven discussions showed highly significant changes for the better. A ward sister who did not even attend the meetings but read of them in the nursing press was so inspired that she set up in her own ward her own discussion group. She had been 12 years in charge of an acute male medical ward of 26 beds staffed by two consultants, three housemen, and about 15 full-time and part-time nurses, auxiliaries, and domestics.

She said, "In the Kings' Fund Reports I was particularly impressed that frank discussion could modify attitudes. I decided to initiate ward meetings. The first problem was time. A ward sister has little time on her hands; this is the first attitude to throw out. One has to make time. Wanting to do it means one has to find the time. Having made up one's own mind, then it is possible to carry it out. I have proved this."

As I see it, this is the key to all attitude change and to all learning. Our problem is to know what it is about this particular sister and her relation to the hospital that precipitates in visible social action the slower changes detectable, but not obviously so, in the analysis of attitude change reported below.

Our ward sister concludes: "I would not like to give the impression that discussions of this type cure all illnesses of the ward, nor that they dramatically alter our attitudes towards each other and the patients. But one thing I do know; discussion and frank appraisal like this can make a considerable dent into this problem of attitudes. . . . It is worthwhile continuing, and I feel that any ward sister would gain if she were prepared to give the time, energy, and thought to initiating such a group on her own ward. I warmly recommend it to anybody really concerned about people, whether patients or visitors, or whether our colleagues who work alongside us each day."

This woman once more demonstrates what some of us have long known and what a few in the HIC Project actually learned: that one can solve problems *both* if one wants to solve them *and* if one recognizes that, in so emotional a situation as a hospital ward, one may in oneself be a substantial part of the problem.

The fundamental question remains: Why do some senior nursing staff think as did this ward sister, and why do others regard not only the HIC Project but the discussions organized at the Hospital Centre as all a waste of time? Even more, why do some regard the discussions as destructive?

The following extract from the Hospital Centre record shows how difficult it may be for some senior nursing staff to change their attitudes: "This debate . . . was the culmination of several requests for students to speak up; the result was personal attack rather than reasoned debate on the points the students had raised. . . . That it was upsetting there is no doubt. How much so can be gauged by *a principal tutor* apropos a student with things to say: 'Empty vessels make the most sound. I have often found that the most vocal student verges on the psychopathic.' "

The Contrasts Revealed

It would be hard to find two attitudes more apparently opposed than those of the ward sister who was convinced of the value of frank discussion merely by reading of the Hospital Centre's efforts in the nursing press, and those of the principal tutor, that guiding light for the future, who identifies a willingness to ask questions as a mark of the psychopath. Yet the contrast appears again and again and at many stages.

The group discussions at The Hospital Centre leave us in no doubt about the immense range of personalities involved. It is as if some nurses are so accustomed to authoritarianism and dependence that no efforts of a psychotherapeutic kind can ever change them, at least not in the particular hospital settings into which they have grown. The point is made by Dr. Tom Caine in his summary of the first discussion series.

"We have seen that the differences are in terms of attitudes to discipline and organization, attitudes to the required degree of personal involvement with the patient, attitudes to a formal versus an informal approach, attitudes to free communication and a questioning of the fundamental scientific status of work, including the value of the formal diagnosis. We are all aware that these questions form the cornerstones of the training of nurses. A nurse trained in the beliefs and attitudes of one type of nursing, indeed of one institution, may find that she is required completely to reverse them on transferring to another.

"My own feeling about the conference on patient care and our analysis of the data is that we have thrown up fundamental problems without yet finding the answers. . . . *All* patients and *all* staff are people and not just diagnostic categories or nursing grades. The full recognition of this is possibly the most therapeutic attitude of all. Perhaps the most important things are to find out how we lose sight of this truism, how we can relearn it and, having done so, what we can do about it."

All I feel able to add to this is that Dr. Caine's observations apply not only to nurses in British hospitals but to all the other human groups, in all five continents, with whose action oriented education I am now concerned. As Henry Wallace observed 25 years ago, this is the Century of the Common Man. Whatever his sex may be, he is at least demanding to be treated as an individual person.

Nursing Discussion Groups and Attitudinal Changes

At the end of the first monthly series of discussion groups, lasting 7 whole days in all and attended by 82 nurses, Dr. Tom Caine, Principal Psychologist at Claybury Hospital, undertook a modest evaluation of their effects. He prepared, from a content analysis of topics raised in such groups, a questionnaire with five broad categories.

One of these could be described as "Getting involved with the patent." Its terms were "A nurse should take care not to show too much interest in patients' deeper problems in order to avoid getting involved . . . . Patients should be discouraged from developing feelings towards staff members. . . . Staff being too friendly towards patients makes for poor discipline on the ward. . . . Patients should not call nurses by their Christian names."

Another man section tested the nurses' views of their relations with the doctors. A third section was on discipline, cleanliness, and efficiency. About two-thirds of the total number of nurses who went through the seven monthly discussions were able to complete the questionnaire twice. The second test was given several months after they had returned to their hospitals.

Score comparisions were rigorous. The usual five-point scale of strongly agree, uncertain, disagree, and strongly disagree was used, but in seeking change of attitudes only reversals were marked. In other words, changing from strongly agree to agree was not considered sufficient indication that there had been any shift of attitude at all, only disagree to agree or vice versa would be admitted. There was a highly significant (below 0.1 percent) change in attitudes toward more involvement with the patients and less subservience toward the doctors. Indeed, for both classes of nurses, general and psychiatric, there were improvements in attitudes in all of the five broad categories recognized in the questionnaire and based on the content analysis of the discussions.

Appendix I

The Aims and Intentions of the HIC Project

1. Normally the demands for order and economy oblige hospital staff to develop procedural rules for overcoming operational problems. If no precise rules exist it is expected that those in authority will use precedent or judgment to settle whatever need may arise. Even if the powers and duties of staff have not been set forth in detail there will exist within every hospital an expectation as to who should handle the emergent problem.

2. In such conditions staff tend not to examine the origins of problems, only to allocate responsibility for dealing with them or to attribute blame should they not be dealt with. Thus there is little true learning, certainly no education, the first objective of which is to encourage the ability to ask those questions most likely to lead to the solution of a problem. Education aims to develop the general capacity to inquire, to show people how to set about finding out. Since, it seems, the principal defect of many hospitals is a lack of awareness of their internal problems, education in this sense is of great importance. The project aims to provide it.

3. We are, as I see it, primarily trying to help those in charge of hospitals and of their services at all levels to use better their own resources in identifying and tackling their working problems. We choose this approach both because we believe that these are the greatest resources that the hospitals have available and because we also believe the hospitals possess at all levels a considerable fund of latent goodwill and ability. Without exception, all research shows that, given the organized opportunity of working through a problem of concern to them personally, those who serve even in the most stressful conditions and who may have seemed most incapable of coping with them can rise to unexpected heights of insight and resolution.

4. Any first project should on this account be seen as a growth point, as a kindergarten in cooperation. It should involve few people, say up to 10, quite significantly, in collecting data and in discussing the meaning of the data and their relevance to the tasks of those involved with them. Beyond this committed core there should be a supporting force of partisans, not deeply involved but willing to give help when asked for it and thus ready to be involved should the project be extended into their territory. Beyond these, all other employees in the hospital should at least know that the project is going on.

A well designed project should have the following qualities:

(a) It should demand the cooperation at all stages of a group of persons whose tasks are interlocked. A study assigned to one or two individuals, to produce a report for others to implement, is useless. The choice of project, its depth and scope, the methods of study to be used, the forms of coordination between individuals, the nature of any report to others outside the group, the methods of putting into effect the findings of the project, and so forth, are all essential subjects for agreement between the team leaders and those whose work will be woven into the study.

(b) It should demand not only cooperation at all stages within the group but also an appeal to sources of information or ideas outside the group. These may at first be limited to purely technical affairs, such as asking for help from the HIC team on methods of interview or of data classification. Or it may turn out that the working group, in order to make real progress, will need to share the experiences of another hospital or even to inquire about the treatment of similar problems in industry. For this reason the hospital team should, at a fairly early stage, be in touch with any local college of technology of commerce with a department of management or administration.

(c) It must be limited in time; from the outset there should be agreement as to when particular stages of the work should be completed. Once such a project is started the

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[1] Revans, R. W., *Hospitals: Communication, Choice and Change*, 1972, pp. 130–132.

interest aroused can be so great that any waiting time may lead to disillusion and hostility in the very places where enthusiasm and cooperation have once been generated.

(d) It should, when completed, suggest another project, elsewhere in the same hospital but involving largely different persons.

5. In work on the project, the framework of authority should be temporarily thrown away. Those involved in it are faced with a new situation: how to define the need, how to collect information how to work with others, how to measure progress and, above all, how to employ their own abilities. It is as if, by stripping away the hypothetical framework of authority, we are trying to understand how individuals think and act as the persons they are. They are being given an opportunity, like children whose teacher has suddenly left the classroom, to compare notes among themselves as to how a problem can best be solved.

6. The project should teach each who works on it at least the following:

(a) to observe how the group respond to the originally understructured situation,

(b) to question what behavior on his part will best help himself or the group,

(c) to act, whether in words or otherwise, of his own volition, as in collecting data or in trying out an idea that seems to him to contribute to the definition or solution of the problem,

(d) to sense the effect of his words or actions: he learns how this behavior has affected others and thus can test the adequacy of his self-understanding.

(e) to generalize from this learning: in the project he will begin to sense the accuracy or otherwise of his own impressions and of those of others; he will see how he and others respond to different attempts to influence and to be influenced; how differing goals and desires, if contrasted and evaluated freely, lead to learning and to improved understanding of communications.

7. It follows that to be successful the groups must be highly informal and the imposition of the traditional framework of authority upon their project must be avoided. I have little fear, now that I know some of the senior staffs of the hospitals personally, that such imposition will deliberately occur once experience of open discussion has been gained. Nevertheless, its removal must be accomplished by slow degrees; senior staffs must gain confidence in free exchanges before subordinates. In this I feel both the HIC and the hospital teams have a role first to learn and then to enact.

Appendix II

An Experiment in Active Learning

In 1971 I was approached by the dean of the Business School at Southern Methodist University, Dallas, who, with the support of some—but a minority—of his faculty, was endeavoring to change the principles upon which the school was run. In the words of Roger Dunbar and John Dutton, two of the dean's active supporters:

"At the School of Business Administration, Southern Methodist University, vigorous efforts have been made to educate students for an active role in society. As a step in this direction, all undergraduate course requirements but one have been abolished. Thus students now must design their own learning program instead of fulfilling a course sequence dictated by the faculty. In this way an attempt has been made to transform the school itself into an environment which challenges the student to act effectively. One required course remained as a setting in which to force students to consider what is involved in designing one's own learning experience. This requirement appeared necessary to the faculty in order to assist students to adopt a more active style of learning behavior, for students at the school tended to behave passively in learning situations, waiting for instructors to generate material rather than seeking information for themselves."

The experiment soon ran into some of the problems of the HIC Project: a lack of intelligibility followed by resentment. In the words of its organizers:

"From the instructor's point of view, the purpose and the design of the course were clear enough and reflected their beliefs as to what was necessary for student learning to occur. Specifically, for students to learn, they would have to be active and responsible for their own behavior. However many students felt lost and confused with this unfamiliar structural design. Some responded with curiosity, exploring what could be done in the new situation. But others became passive, sullen, or even violently angry because they could not understand what was expected of them. These disaffected students seldom found helpful the extensive written handouts distributed in the course concerning the purpose, structure and available options of the course. . . . "Fromm's (1941) discussion of freedom may be used to help understand the variety of student responses to the course. Fromm distinguishes between freedom *from constraints* and freedom *to develop* facilitating structures that allow individual achievement. The absence of many of the expected instructor demands provided freedom *from* many of the usual course constraints. However, students often showed little freedom *to develop* new behavioral responses to utilize the new freedom from expected instructor demands. Some got angry because they did not perceive the instructors as willing to tell them what to do and a number remained antagonistic throughout the semester. Others became angry because they could not reconcile the freedom that did exist in the course with any constraints whatever; they may have felt that the requirement that they examine the consequences of their own choices contradicted the idea of freedom to make choices.

"Still others, originally skeptical, eventually saw the purpose of the course. Frequently, these indicated they only regretted it had taken so long to become aware of the objective. Finally, those who were already highly motivated to learn reported that as a result of the course they were even more enthusiastic about their work at school. In summary, responses to the course appeared to vary greatly and the instructors believe they probably reflected whether students were able to formulate new behavioral responses to cope with new demands of the learning environment."

Nothing could describe our experiences with the HIC Project more faithfully. As at S.M.U., moreover, there were members of the staff who were unable to grasp this idea of freedom to undertake one's own learning.

Two Extremes of Students

In the HIC Project no effort was made to discriminate between two types of hospital staff as the S.M.U. studies discriminate between acceptors and rejectors of the new learning program. Some of the central team were aware—as, indeed, is shown here in the main paper—that some of the hospital staffs had more difficulty than others in grasping the notion of self-directed studies. But at S.M.U., where conditions for quantitative evaluation were possible, a deliberate search was made to identify the extremes among the 412 students who took the course. Of these there were chosen 32 manifest acceptors and 32 manifest rejectors of this new method: the discriminating criterion was the persistence with which they waited for guidance from the teacher *and* abstained from experimenting with their new methods. The manifest acceptors neither waited nor abstained; the manifest rejectors did both.

It was then shown, as a result of a survey involving a sample of 238 students of which the two sets of 32 are therefore about one quarter, that there were categorical differences between the two sets. Among the manifest acceptors there were significant positive correlations between learning and efforts to assess the feelings of the other students and of the teacher. Learning among the manifest acceptors was thus coupled with an awareness of others in the group. Among the manifest rejectors there was no such correlation: instead there was a significant positive correlation between learning and a desire to be noticed by the teacher.

In the light of our HIC Project experience, these results are very plausible. Both the Severalls and the Middlesex Hospitals stress, moreover, that the attitudes of the junior nurses ultimately reflect those of their seniors (a result also reported in *Standard For Morale*). It therefore looks as if our first task is to persuade those in the senior posts of the hospitals to act as manifest acceptors. Anything effective in the way of change will demand, at all times, the support of those in authority.

In the many programs of institutional change with which I have been concerned since the HIC Project, I have been more than careful to involve the coalitions of power responsible for the participating institutions. Not enough attention was given to this in launching the HIC Project. In our latest attempt, to stage a development program for the nationalized industries of Syria, we have not only secured the personal interest of the Prime Minister but allocated to him an operational role and a timetable to go with it. Since the program was designed at his invitation—having heard of its success in another Arab country—we may be confident that, should our efforts fail, it will not be for lack of high level interest.

Impact of Computerized Information Systems on Nurse Staffing in Hospitals

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Introduction

To describe the impact of a technological development such as computerized information systems, it is necessary to define and understand the problem area to which it is applied. Nurse staffing in hospitals is a broad and complex topic. For the purposes of this discussion, nurse staffing will refer to the following two problems:

- How many of each type of nursing personnel are needed on inpatient nursing units?
- How can the assignments of personnel be made to fit those needs?

I would like to discuss what impact computerized information systems might have on these components. To answer the first question, how many of each type of nursing pesonnel are needed on inpatient nursing units, four items of information are required:

(1) What kinds of tasks need to be done by the nursing staff?
(2) How many of each task are there to be done on any given shift on any given nursing unit?
(3) Which nursing personnel type should do each task?
(4) How long does it take to do each task?

From these four items of information, we can determine the nursing staff needs on any nursing unit at any time such information is available.

To answer the second question, how can the assignments of personnel be made to fit those needs, we must have the means to provide the items of information sought in the first question on a timely basis and must then have the ability to optimize the distribution of available staff according to those needs. This optimization can occur on a short-term, dynamic basis, or on a long-term basis. The advantages and disadvantages of each approach will be mentioned later. I would like now to discuss how all of this might be accomplished and what role a computer system might play.

We have not solved the nurse staffing problem at Johns Hopkins. However, we have partially solved a related problem that I think will provide some basis for solving the staffing problem. I would like to digress for a while to describe some of the work we have been doing the past year.

Approximately 2 years ago we became interested in the general problem of management of an inpatient nursing unit. What is the process by which the nursing staff carry out their duties, how well does this process work, and what might be done to improve it? In general, nurses do two categories of tasks: those that the doctors tell them to do and those that they decide themselves need to be done. Let us first look at what the doctors tell them to do; i.e., the carrying out of physicians' written orders.

At our hospital, the nurses use the traditional kardex system of carrying out orders. There are about a dozen different kinds of orders each carried out in a different way. As an example, figure 1 shows what happens when a physician writes an order to have a patient weighed on a periodic basis; e.g., every other day. The basic steps are the writing of the order, the initial transcription, the written communication onto some working document, the execution of the order by the nursing staff, and the communication of the result back to the physician. Figure 2 shows this same process for a vital sign order; i.e., the order to measure the pulse, temperature, respiration rate, and/or blood pressure at some given interval. Figure 3 shows this process for an intravenous fluid order.

The point of these figures is simply to illustrate the complexity of our manual "system" of carrying out orders. Of the 12 categories of orders we studied, no less than 13 different documents are used to keep track of these orders. One naturally asks, "Why was the system designed this way and how well does it work?" It is clear that the system was not designed at all. Rather, it evolved. It evolved over 60 to 70 years with changes made frequently by different people in different decades to meet certain expediencies.

In answer to the second question, how well does it work, we made some observations. During a 2-week period on one acute inpatient medical ward, all physicians' orders were examined. Each order was read and evaluated, the transcription was read, the written communication onto various documents was checked, and on site observations were made to determine whether or not the order was carried out. This was done for the nonmedication orders only.

Figure 4 summarizes the results of these studies. Of the 1,592 observations made, about 15 percent of the orders were not carried out. In each such instance, an attempt was made to determine the exact point on the flow chart of that order that accounted for the failure. As well as could be determined, 14 percent of the problem could be attributed to the physician's original order, 4 percent to transcription of the order, 22 percent to written communication of the order subsequent to the initial transcription, 58 percent to the execution (actually nonexecution) of the order by the nursing staff, and 2 percent to notification errors. (Notification refers to those specific orders in which the physician requests to be notified of a certain finding if it occurs.)

Another study performed was a traditional nursing activity study in which random observations were made to see what nurses did with their time while on the ward; i.e., when they were not supposed to take a break. Our results are similar to other such studies and are shown in table 1. A nurse spends about 30 percent of her time at the bedside and about 40 percent of the time doing indirect care activities such as paperwork, supply functions, and preparing medications.

From these observations of the problems it was possible to determine some requirements for their solution. This process of determining functional requirements to solve problems is a creative or synthetic process, whereas everything prior to this point was an analytical process. Thus, as in any creative process, there is tremendous latitude as to the types of solutions that could be derived, and there is considerable judgment as to the initial solutions to try.

For each problem identified in the analysis phase a number of possible alternative solutions were considered. The details of this process will be reported elsewhere. The results of this synthetic phase were a set of 14 functional requirements for a new system. These are shown in figure 5. Let me call your attention to requirement 6, to allocate nursing staff dynamically according to needs. This is the subject of this entire conference, yet note that it is only one of 14 requirements we had for solving the problems of managing our wards. This particular requirement is related primarily to one of the problems found in the analysis phase, the fact that 58 percent of all orders not carried out were due to the lack of execution by the nursing staff.

One reason the nursing staff do not execute

Figure 1.—Flow chart of weight order.

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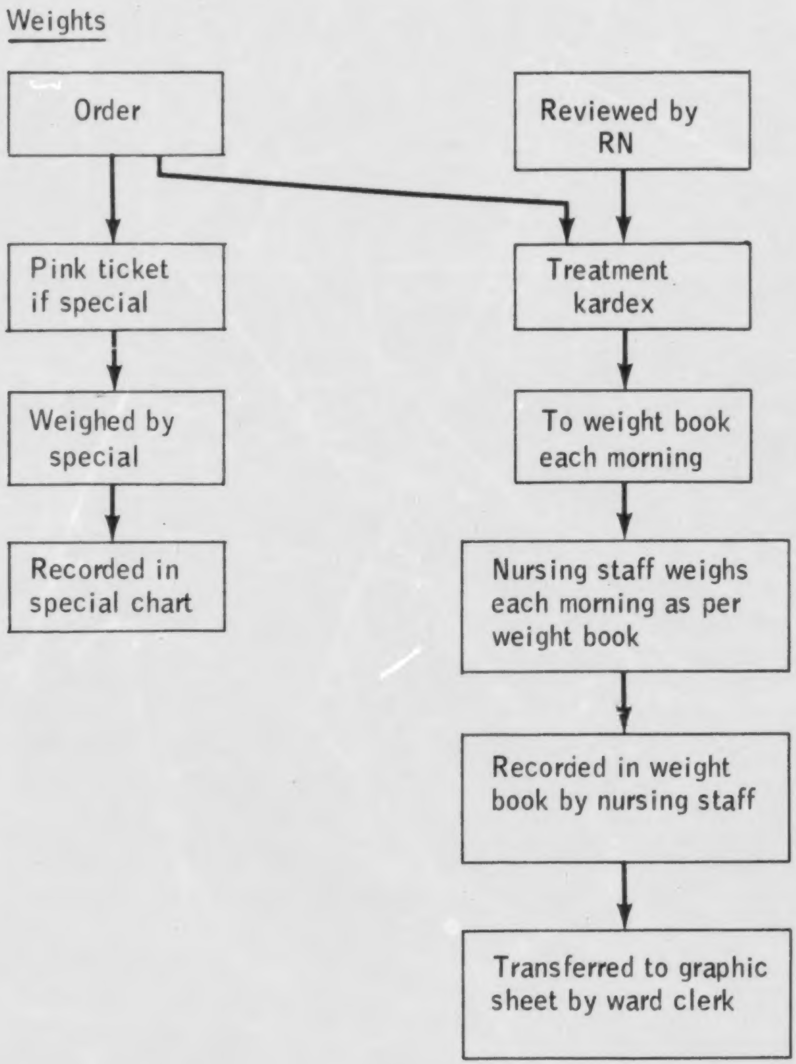
Weights
Order
Reviewed by RN
Pink ticket if special
Treatment kardex
Weighed by special
To weight book each morning
Recorded in special chart
Nursing staff weighs each morning as per weight book
Recorded in weight book by nursing staff
Transferred to graphic sheet by ward clerk

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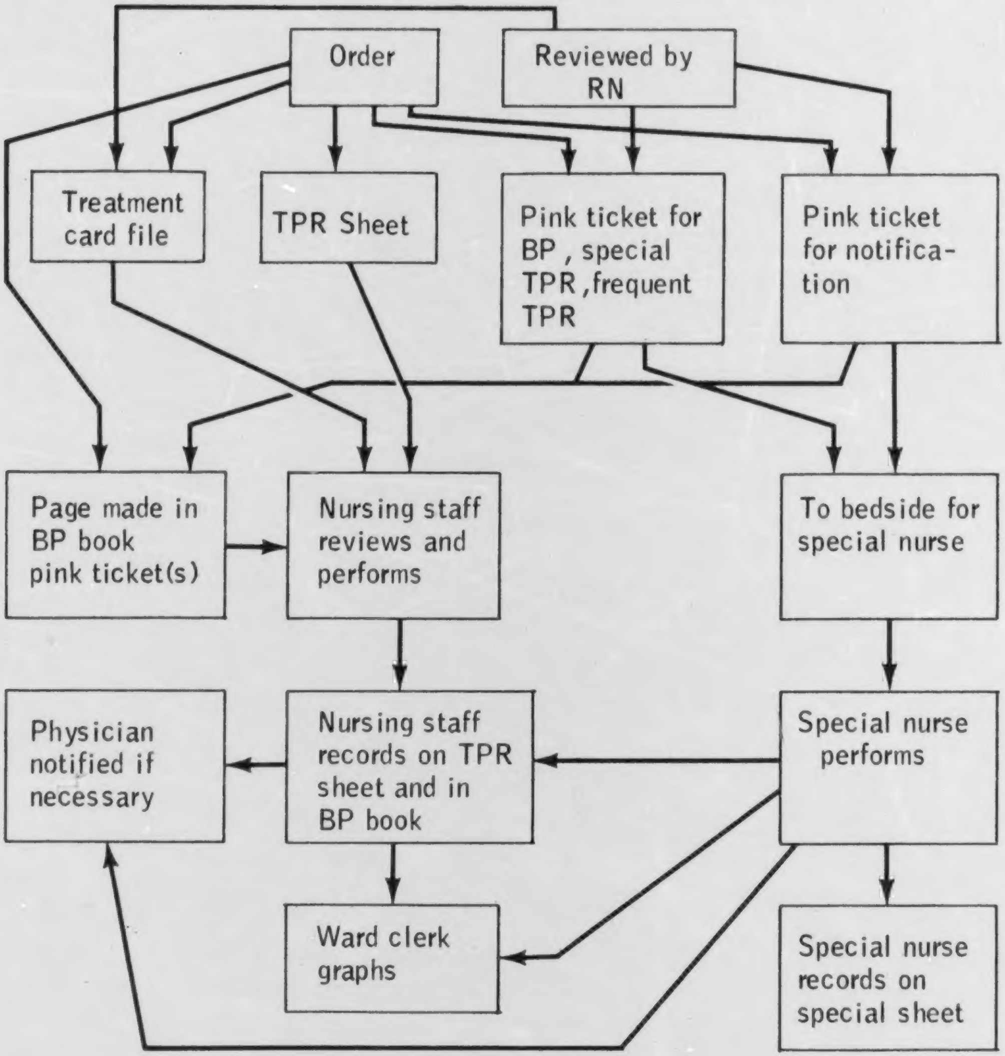
Figure 2.—Flow chart of vital sign order.


Order
Reviewed by RN
Treatment card file
TPR Sheet
Pink ticket for BP, special TPR, frequent TPR
Pink ticket for notification
Page made in BP book pink ticket(s)
Nursing staff reviews and performs
To bedside for special nurse
Physician notified if necessary
Nursing staff records on TPR sheet and in BP book
Special nurse performs
Ward clerk graphs
Special nurse records on special sheet

T=Temperature, P=Pulse, BP=Blood Pressure, R=Respiration, RN=Registered Nurse

Figure 3.—Flow chart of intravenous fluids order.

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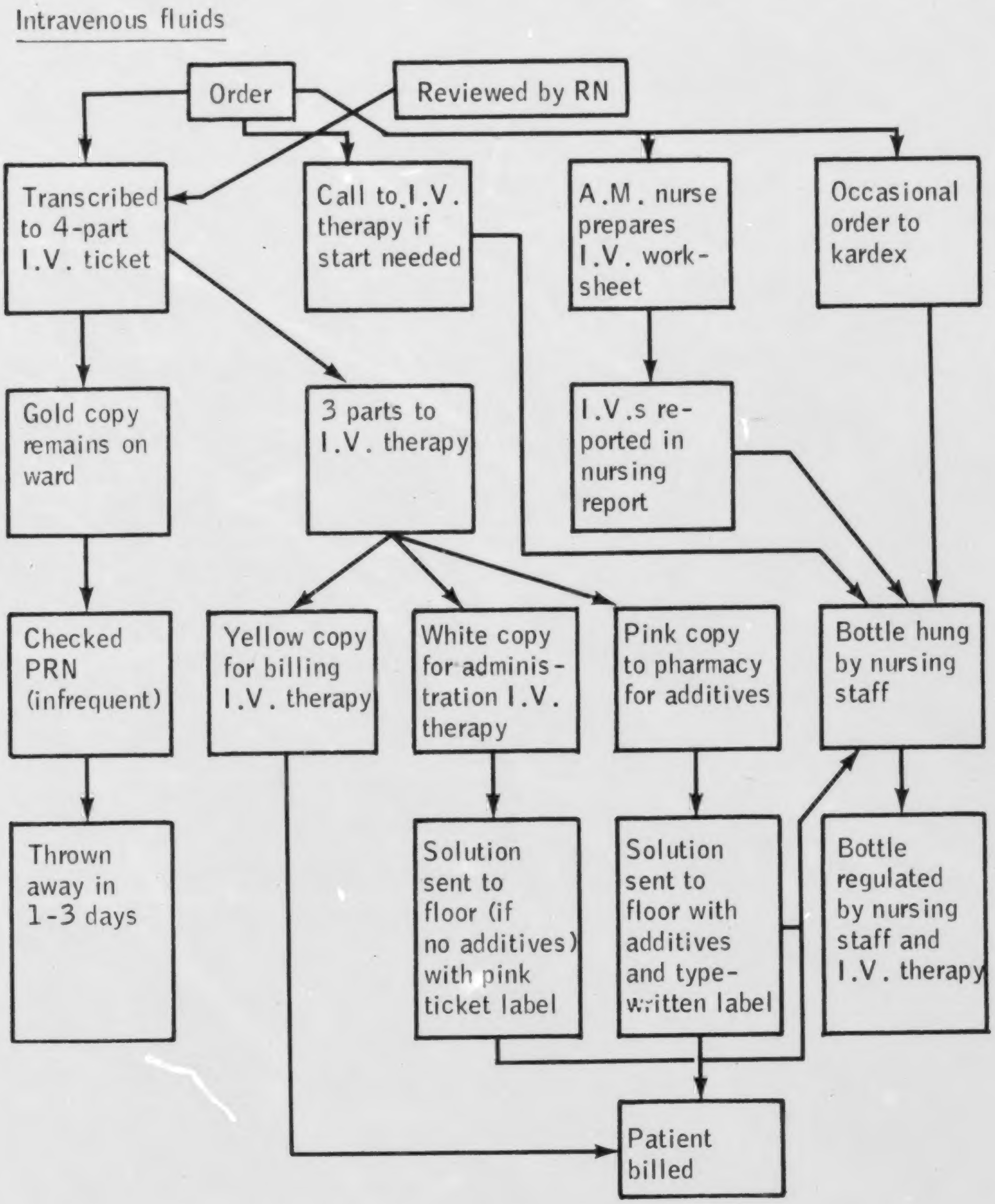
Intravenous fluids
Order
Reviewed by RN
Transcribed to 4-part I.V. ticket
Call to I.V. therapy if start needed
A.M. nurse prepares I.V. work-sheet
Occasional order to kardex
Gold copy remains on ward
3 parts to I.V. therapy
I.V.s reported in nursing report
Checked PRN (infrequent)
Yellow copy for billing I.V. therapy
White copy for administration I.V. therapy
Pink copy to pharmacy for additives
Bottle hung by nursing staff
Thrown away in 1-3 days
Solution sent to floor (if no additives) with pink ticket label
Solution sent to floor with additives and type-written label
Bottle regulated by nursing staff and I.V. therapy
Patient billed

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Figure 4.—Physicians' orders study

1,592 On-Ward Operational Observations
  234 Failures—15%
    1. Physician—14%
    2. Transcription—4%
    3. Written communication—22%
    4. Execution—58%
    5. Notification—2%

Figure 5.—Functional requirements of a new system to carry out physicians' orders

1. Provide a legible, convenient summary of the physicians' current orders in a place where he is likely to look at them daily.
2. Provide a review process at the input phase of physicians' orders in which an RN verified the input.
3. Have physicians write orders on prenumbered order sheets. Provide a mechanism to account for every order number.
4. Eliminate manual communication.
5. Schedule nursing tasks so as to reduce peak workloads.
6. Allocate nursing staff dynamically according to needs.
7. Provide a single document from which nursing staff can see at a glance all tasks needed to be performed at any given hour.
8. Provide a mechanism by which the head nurse can monitor what tasks need to be done in the coming hours as well as what tasks were not carried out during the previous hours.
9. Indicate notification orders in the place where the specific patient recording must be made.
10. Make all recorded patient observations at the bedside at the time of the observation.
11. Avoid transcription of recorded patient observations.
12. Summarize all recorded patient observations in a convenient format in a single location for the physician to review at the time of morning rounds.
13. The new system should require less nursing staff administrative time to maintain than the present system.
14. The costs of the system must be appropriate for the benefits provided.

orders is that they are too busy, hence the need to staff appropriately. There are many other reasons why nurses do not carry out their tasks that would not be solved by appropriate staffing, hence the need for other requirements. I would like to call your attention to several other of the requirements on the list, particularly 7, 8, 13 and 14. We needed to provide the nurses with a simple way to know what tasks were scheduled to be done at any given hour of the day. This is again related to the execution problem, since some orders are not carried out because people forgot and others because some people may never have become aware of the need to carry out the order in the first place. Also, there is no *easy* mechanism for the head nurse on the floor to monitor or supervise her staff. Finally, any new system that we implement should reduce nursing staff indirect care time, or at least not increase it. And, of course, the hospital must be able to afford the costs of the system.

With these and other requirements in mind, a new system to carry out physicians' orders was designed and implemented on one of our acute medical nursing units. This is a computer based system that I will describe only briefly. This system meets all of the requirements listed except that we do not yet staff our floors dynamically according to needs, nor do we reschedule nursing tasks. We feel that we have the means to develop a dynamic staffing system based on what we are now doing.

Figure 6 is a diagram of our current system. Twice a day we produce output documents. This output is listed in figure 7. Again, I do not wish to describe the entire system but just that part which may be relevant to nurse staffing. The most important information in this regard is illustrated by one of our output documents called the "Team Action Sheet." An example is shown in figure 8. Our unit consists of three nursing teams each with approximately 10 patients. For each hour of the day for each team, the action sheet shows all tasks that must be performed on any of their patients at that hour as determined by the orders.

This output document, as well as all others we produce, was not designed to solve a nurse staffing problem. The primary goals of this system were as follows:

(a) reduce errors in transcribing and communicating physicians' written orders,

(b) reduce failures in carrying out appropriate nursing tasks,

(c) reduce nursing staff administrative time.

We evaluated the system on the one nursing unit by repeating the studies I showed you earlier on a floor with the traditional kardex system. Table 2 summarizes these repeat studies. As you can see, each of the original goals of the system has been met.

How does all of this relate to the problem of nurse staffing per se? Can this system and other computer information systems have any effect on that? To answer these questions, let us look again at the questions which we said earlier needed to be answered.

Number of Each Type of Personnel Required

Kinds of Tasks To Be Done

We can see from the output shown in figure 8 (and some other output documents not shown) what kinds of tasks nurses do related to physicians' written orders. The nursing staff, however, perform other tasks or duties not related to the care of the patient such as bed changes and patient hygiene. Other tasks that the nurses initiate are specific for the particular problems of their patients.

We have looked at these tasks and have instituted a procedure in which the nurse makes an assessment of the patient's nursing needs and develops a nursing care plan as usual. In addition, however she writes a set of nursing orders in the order book just as the physician does so that reminders will appear on the Team Action Sheet to perform those tasks as well as the physician generated tasks. Table 3 is an example. If the patient has a nasogastric tube in place, the nurse will write the order "NG Tube Care." This will automatically generate the message shown in table 3 at the time indicated.

These messages and times were derived by the nursing staff as minimum procedures consistent with good nursing care. Modification of the "stand-

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Figure 6.—General flow chart of new system.

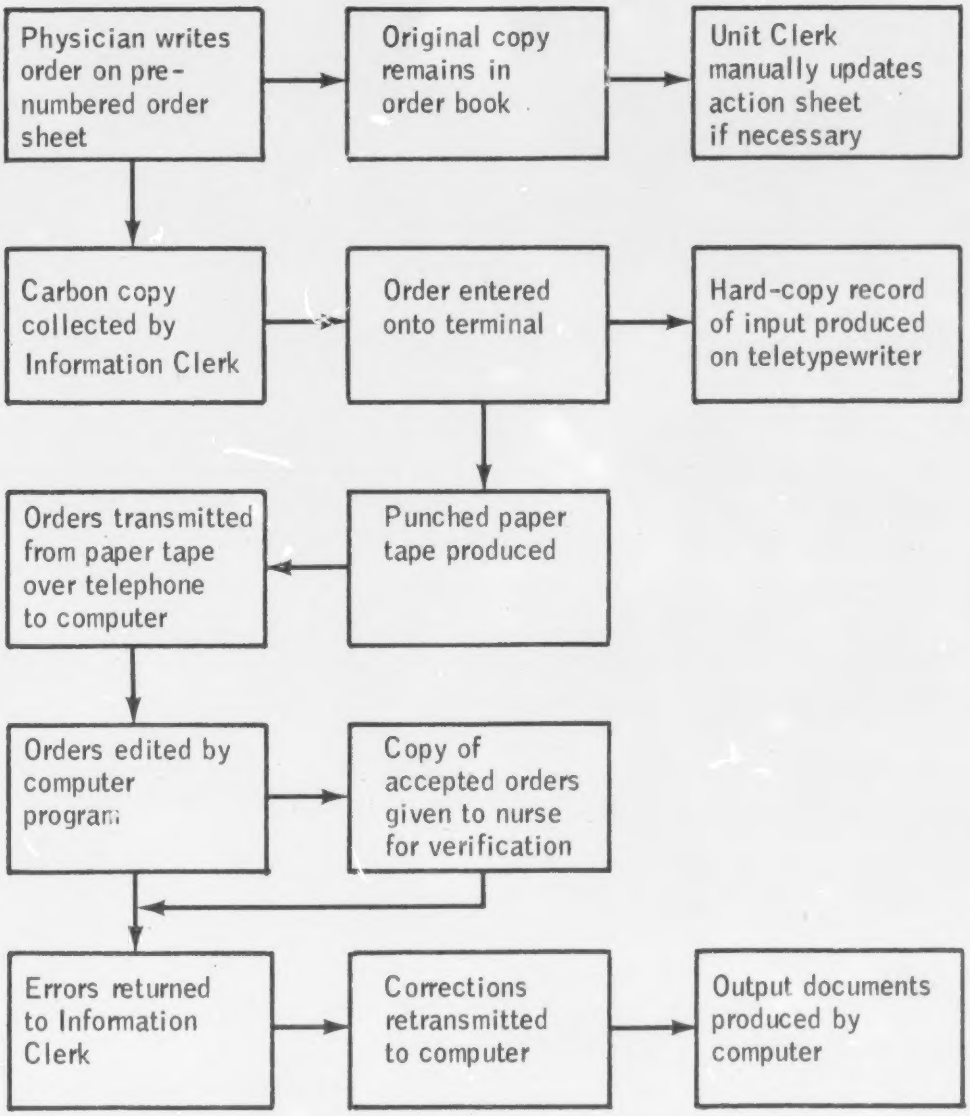
Physician writes order on pre-numbered order sheet
Original copy remains in order book
Unit Clerk manually updates action sheet if necessary
Carbon copy collected by Information Clerk
Order entered onto terminal
Hard-copy record of input produced on teletypewriter
Orders transmitted from paper tape over telephone to computer
Punched paper tape produced
Orders edited by computer program
Copy of accepted orders given to nurse for verification
Errors returned to Information Clerk
Corrections retransmitted to computer
Output documents produced by computer

Figure 7.—System output documents

- I. Action Sheets
  - A. By Team
  - B. Special Patient
  - C. By Function
    - 1. Diet List
    - 2. Utility Room List
    - 3. Weight List
    - 4. Specimen List
    - 5. Intake and Output Sheets
    - 6. Patient Lists
    - 7. Temperature-Pulse Sheet
- II. Standing Order Sheets

Figure 8.—Team Action Sheet.

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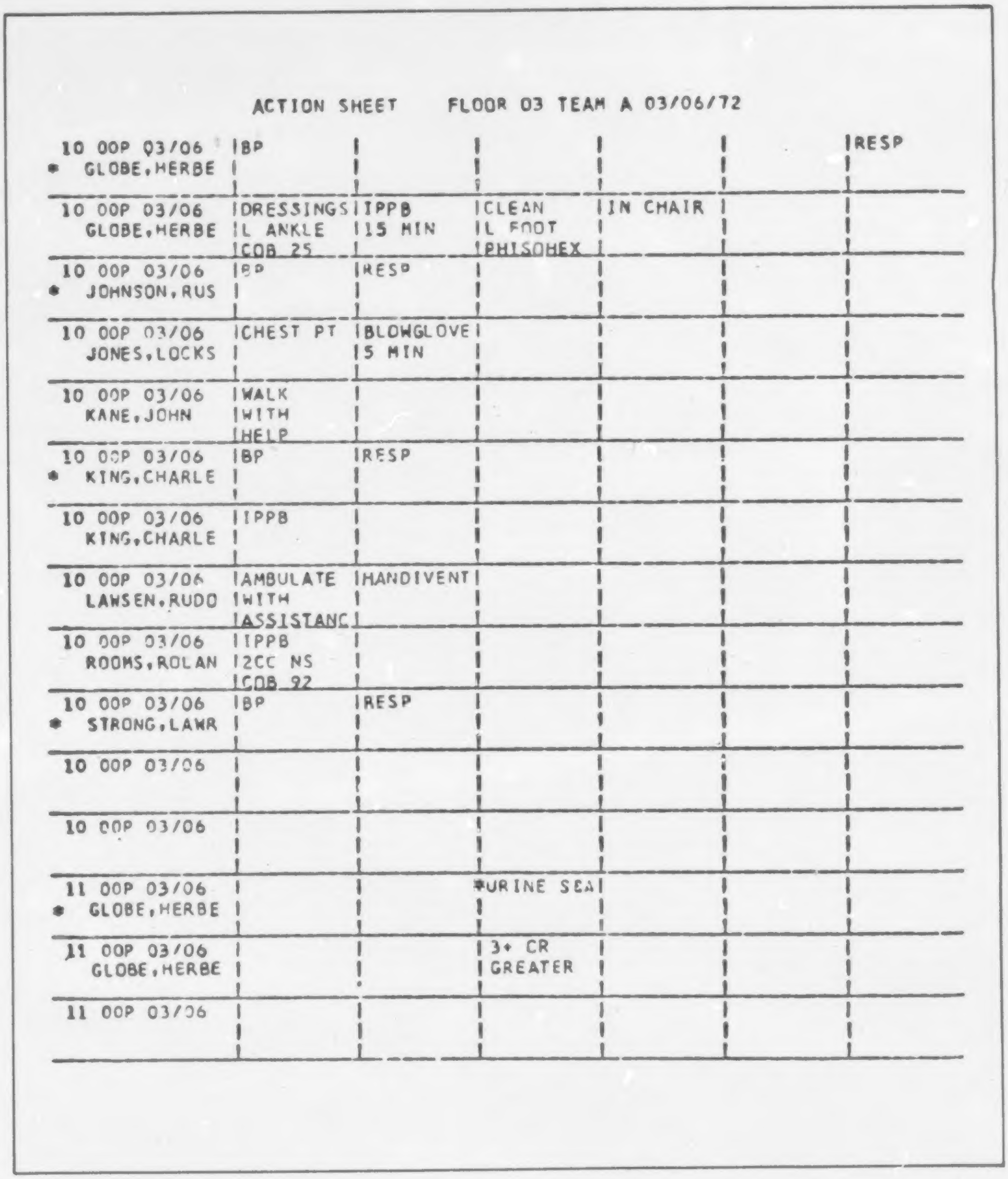

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                 ACTION SHEET    FLOOR 03 TEAM A 03/06/72

 10 00P 03/06  |BP       |         |         |         |         |RESP
*  GLOBE,HERBE |         |         |         |         |         |
               |         |         |         |         |         |
--------------------------------------------------------------------------------
 10 00P 03/06  |DRESSINGS|IPPB     |CLEAN    |IN CHAIR |         |
   GLOBE,HERBE |L ANKLE  |15 MIN   |L FOOT   |         |         |
               |COB 25   |         |PHISOHEX |         |         |
--------------------------------------------------------------------------------
 10 00P 03/06  |BP       |RESP     |         |         |         |
*  JOHNSON,RUS |         |         |         |         |         |
               |         |         |         |         |         |
--------------------------------------------------------------------------------
 10 00P 03/06  |CHEST PT |BLOWGLOVE|         |         |         |
   JONES,LOCKS |         |5 MIN    |         |         |         |
               |         |         |         |         |         |
--------------------------------------------------------------------------------
 10 00P 03/06  |WALK     |         |         |         |         |
   KANE,JOHN   |WITH     |         |         |         |         |
               |HELP     |         |         |         |         |
--------------------------------------------------------------------------------
 10 00P 03/06  |BP       |RESP     |         |         |         |
*  KING,CHARLE |         |         |         |         |         |
               |         |         |         |         |         |
--------------------------------------------------------------------------------
 10 00P 03/06  |IPPB     |         |         |         |         |
   KING,CHARLE |         |         |         |         |         |
               |         |         |         |         |         |
--------------------------------------------------------------------------------
 10 00P 03/06  |AMBULATE |HANDIVENT|         |         |         |
   LAWSEN,RUDO |WITH     |         |         |         |         |
               |ASSISTANC|         |         |         |         |
--------------------------------------------------------------------------------
 10 00P 03/06  |IPPB     |         |         |         |         |
   ROOMS,ROLAN |2CC NS   |         |         |         |         |
               |COB 92   |         |         |         |         |
--------------------------------------------------------------------------------
 10 00P 03/06  |BP       |RESP     |         |         |         |
*  STRONG,LAWR |         |         |         |         |         |
               |         |         |         |         |         |
--------------------------------------------------------------------------------
 10 00P 03/06  |         |         |         |         |         |
               |         |         |         |         |         |
               |         |         |         |         |         |
--------------------------------------------------------------------------------
 10 00P 03/06  |         |         |         |         |         |
               |         |         |         |         |         |
               |         |         |         |         |         |
--------------------------------------------------------------------------------
 11 00P 03/06  |         |         *URINE SEA|         |         |
*  GLOBE,HERBE |         |         |         |         |         |
               |         |         |         |         |         |
--------------------------------------------------------------------------------
 11 00P 03/06  |         |         |3+ CR    |         |         |
   GLOBE,HERBE |         |         |GREATER  |         |         |
               |         |         |         |         |         |
--------------------------------------------------------------------------------
 11 00P 03/06  |         |         |         |         |         |
               |         |         |         |         |         |
               |         |         |         |         |         |
--------------------------------------------------------------------------------
```

ard" formats can be specified at the time the nurse writes her orders. The combination of nursing orders and physicians' orders does not include all of the tasks done by nurses, but it does cover the great majority of the patient related variable tasks.

Number of Each Task To Be Done

This has been the most difficult aspect of determining nursing needs in the past—the quantification of the workload. In the system I have described, we are informing the nurses, on an hourly basis for each nursing team, which tasks need to be performed. It is a simple process for the computer to add up these tasks according to any categories desired. Thus we have captured in the computer, prior to arrival of the nursing staff, a quantitative estimate of a major part of the nursing staff workload—indeed the part related to the most unpredictable variable—the specific need of each patient.

The estimate is not based on patient classification. It is not based on patient diagnosis. Rather, it is based upon the most appropriate determinant of nursing staff needs for each patient—the specific configuration of tasks needed for that patient regardless of diagnosis or broad classification. It does not require any extra nursing time to provide. The basic input is *unrelated* to nurse staffing. It is related to the actual process of patient care, thus ensuring a greater probability of accuracy of input. This workload determination can be calculated for each nursing unit, nursing shift, nursing team, and even hour of the day if necessary.

Type of Personnel for Each Task

This must be a nursing decision and will not be done by an information system. However, in situations in which the workload to be done exceeds the number of personnel available, the computer could be used to specify which tasks should be done by which personnel (assuming that many tasks can be done by more than one personnel type) so as to maximize the amount of work actually done. More will be said about this later.

Time Required for Each Task

This will vary from situation to situation for a given task but, generally speaking, measurements have been made on the variety of nursing tasks so as to arrive at reasonable average times. Having defined the tasks to be done, quantitated the tasks, associated each task with a personnel type, and determined an average time to perform a task, one then has a statement of nursing staff needs. After doing these calculations for each shift on each nursing unit one can then consider staff assignments.

Assignment of Personnel

One approach would be to measure these nursing staff needs daily for a long period of time and determine the range and mean of nursing staff needs for each nursing unit for each shift. Since we are not yet performing a nurse staffing function, we have not yet written the program to do this. However, just out of curiosity, we wrote a program that simply adds up the total number of tasks done on our experimental nursing unit each day. I ran this program on a sample of rather randomly selected days and the summary of the output is shown in table 4.

For the sake of discussion, let us assume that the number of staff needed on each of these days is directly proportional to the number of tasks to be performed—an obvious over simplification. One way to staff this unit would be to pick some arbitrary level of preparedness; e.g., to be able to carry out all of the tasks 80 percent of the time. This is more or less the way we staff most hospitals today. By definition, we are understaffed a certain amount of the time and overstaffed a certain amount of time. The computer system just described could be used to staff in this manner, the only difference would be that we would know what those proportions of under and overstaffing were. I am not sure knowing this has much value.

Suppose, however, that we have two or more similar nursing units. Let us further suppose that the day-to-day variations in nursing staff needs are not completely synchronous between these two or more units. That is, although the general load of

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Table 1.—Nursing activity study

Nursing personnel category	Direct care	Indirect care	Other
	Percent	*Percent*	*Percent*
All	31	36	33
Nurse	26	44	30
Technician	45	23	32
Aide	32	33	35

Table 2.—Summary of repeat studies on experimental floor

Observation	Traditional system	Experimental system
Transcription error rate	3.4%	1.7%
Communication errors	19/week	3/week
Failure rate in carrying out orders	14.7%	5.8%
Direct care activities (all personnel)	31%	38%
Indirect care activities (all personnel)	36%	28%

Table 3.—Sample nursing order: "NG Tube Care"

Order	Message on action sheet	Times of message
NG tube care	Check patency NG tube	Q4H
	Mouth and nasal care	Q8H
	Change adhesive tape	QD
	Empty NG tube drainage	Q12H
	Notify house officer if bloody drainage	Q12H
	Record NG drainage volume	Q12H

Table 4.—Total number of nursing tasks on one nursing unit on selected days

Date	Total tasks
7/30/71	608
10/29/71	1,109
10/30/71	1,188
11/11/71	957
11/12/71	746
11/15/71	652
11/21/71	527
12/9/71	516
12/10/71	797
12/11/71	611
12/15/71	804
12/19/71	627
12/30/71	273
3/18/72	647
4/11/72	397
Range	273-1,188
Mean	677

patients will vary roughly in parallel between these units, day-to-day variations in the particular kinds of patients will lead to unequal workloads on these units. Having the ability to measure these workloads on a real-time basis as our system may be able to do, a flexible or dynamic staffing system based on this ability to monitor workload is possible. Thus, although the total number of nursing staff personnel is fixed, their distribution among the nursing units will vary from day to day.

In addition to providing a real-time measure of nursing staff needs, can the information system be used to help in distributing the staff? With the help of Dr. Judith Liebman, Assistant Professor of Public Health Administration, we developed the following model. Suppose that we prefer a nursing aide to perform task (i). If an aide is not available, a licensed practical nurse (LPN) could also perform this task as a second choice and furthermore, a registered nurse (RN) could do it as a third choice.

Let us then define a coefficient C, such that $C=3$ if an aide performs task (i), $C=2$ if an LPN performs it, and $C=1$ if an RN performs it. Let us make these judgments for each task. Associated with each task (i) will be a timing constant t_i related to how long it takes to perform task (i). If we know how many times (n_{ik}) task (i) must be done on a given shift on a given nursing unit (k), then for any task (i), $n_{ik}t_i$ tells us how long it will take to do all of task (i) on nursing unit (k). Let X_{ijk} be the proportion of time that personnel type (j) performs task (i) on nursing unit (k). If we always assign the most preferred personnel type (j) to perfrom task (i), then for that (ij) combination $X_{ijk}=1$. For any other (ij) combination for the same task (i) $X_{ijk}=0$. Then $\sum_i n_{ik}t_iXijk$ is a measure of the total hours of each personnel type (j) needed to ideally staff nursing unit (k).

Summing for all nursing units gives the total amount of each personnel time needed for all the units. If it so happens that we have available at least enough of each type personnel our problem has ended. But unfortunately, the exact mix of personnel needed for all the units will not correspond exactly to what is available every day. Thus we can utilize the information contained in the coefficients C for each task (i) for each personnel type to modify personnel assignments. Thus if task (i) can be done by any one of the three personnel types (j), each one having a different value of the coefficient C_{ij}, then $\sum\sum\sum_{ijk} C_{ij}n_{ik}t_iX_{ijk}$ is maximum if the personnel (j) performing task (i) is always the most desired (i.e., with the highest value of C_{ij}).

It is possible that on a given day the values of n_{ik} will be so high that there is no solution to the problem assuming we wish to carry out every task. We are then forced to assume that something less than 100 percent of all tasks will be performed and solve the linear programing equations for this arbitrarily reduced value of n_{ik}. We can decrement all n_{ik} equally by the coefficient F and determine the highest value of F that will allow the equation to be solved. Or we can assign priorities to the tasks and in the event that the total workload on all the units together exceeds the total available staff, no matter how they are distributed, certain tasks will be eliminated first.

This in actuality is what happens every day in our hospitals in an unplanned manner. In either case, we will always be able to find some proportion of the total workload that can be done by the available staff and we will be able to optimize the distribution of that staff to perform that part of the total workload. This optimization can then be suggested to the nursing administrator prior to arrival of the staff for that shift.

Many of the ideas expressed here are not original. However, the possibility that we can actually carry out some of these ideas because of information systems under development places them in a new perspective.

Summary

The impact of computerized information systems on nurse staffing in hospitals occurs in the areas described below.

- They will permit an accurate assessment of nursing staff needs on inpatient nursing units.
- They will be able to monitor these needs on a real-time basis so they can be used in time to make judgments about staff assignments on a shift-to-shift basis.
- They will provide the nursing administrators with a statement as to the ideal number of each personnel type needed to staff each nursing unit for each shift. The nursing administrator can use this information as she pleases.
- They will suggest to the nursing administrator an optimal distribution of her available staff to meet the needs. Furthermore, they can indicate which tasks the optimization assumes will *not* be done and *who* it assumes will be doing those tasks that *will* be done.

What other impact might these systems have? Let us return to table 2 in which we showed a reduction in nursing staff indirect care activities. In addition to helping assign the staff to carry out the tasks, an information system will *reduce* the types of tasks to be done by the nursing staff in the first place.

Finally, there is one other important factor relating to nurse staffing. Once we narrow the tasks down to those that truly must be performed by nursing personnel, the physicians are still free to order as many tasks to be performed as they feel necessary. In the past, little attention has been paid to what orders doctors write. Recently, however, people are interested in the fact that in seemingly comparable situations, different physicians order different services. This can be reflected in the nursing tasks they order. When people began to audit laboratory test ordering practices of physicians, it appeared that at least in some cases there was over utilization of the laboratories.

With an information system such as the one described here, it is now possible to quantitate and audit the physician utilization of nursing services. Perhaps over utilization can be detected here as well, and appropriate feedback to the physicians may affect these practices.

To give an overall answer to the question, What is the impact of computerized information systems on nurse staffing in hospitals?, I say this:

- They will help determine which tasks will be performed for patients in various situations.
- They will help perform some of the tasks, relieving nurses of nonnursing functions.
- They will permit measurement of nursing staff needs on a timely basis and provide recommendations on the appropriate distribution of available nursing staff to meet these needs.

DISCUSSION OF DR. SIMBORG'S PAPER

Discussion Leader

Miss Marlene Slawson

Research Associate, Operations Research Unit
Division of Community Psychiatry
School of Medicine
State University of New York
Buffalo, New York

Miss Slawson

Dr. Simborg's paper has presented some thought provoking ideas, and I should like at the outset to state my own position: I am not opposed to the philosophy of the use of computers in certain hospital settings, but I feel we should move with caution in certain areas.

I will comment on several points of the paper. Dr. Simborg indicated that 58 percent of the failure of tasks noted in the study resulted from simple nonperformance. The first question is, Were these all really nursing tasks or were they nonnursing tasks with the failure on the part of the laboratory personnel rather than nursing? Second, Was the failure of the task related to resources such as the lack of equipment? Third, Was the nonperformance of the task related to the question of the nurse, whether or not it really was a valid task to be done? He indicated that one of the reasons the nursing staff does not execute orders is that they are too busy, hence the need to staff appropriately. Maybe an alternative should be to staff more efficiently with what staff is available.

Dr. Simborg indicated also that the computerized information system will help perform some of the tasks, relieving nurses of nonnursing functions. My question here is, Can another kind of system accomplish the same result for less overall total cost? His basic premise is that automated data processing techniques can be used to enhance the development of quality performance by processing orders and by increasing performance of nursing care. What does the addition of a computerized information system add that other manual systems cannot? Does a computerized information system increase quality? Does it decrease cost? Does it increase efficiency? Does it increase staff satisfaction? I did not find presented any kind of evidence that comparative studies have been done to indicate that an automated data processing system as proposed by Dr. Simborg can present quality data to answer the above questions.

I feel the system proposed here today has certain limitations. While it can simplify the presentation of a complex idea, it can also oversimplify it. And one of the constant problems faced by many researchers in this area is that in the study of human behavior there is the necessity of translating complex relationships, concepts, and ideas into some type of a simpler representation of form.

I agree very much that it is necessary to contain a conceptual description of the system. This includes taking the institutional needs and patients' needs, coupling them with the resources, both of staff and equipment, and then evaluating them in terms of quality execution of patient care, patient satisfaction and personnel satisfaction. The system described was based upon physicians' orders as presented by nurses themselves in terms of their own description. Alternative input that could enter into the model are those tasks performed by the institution in terms of protocol and policy.

For example, patients receive baths that are not specifically ordered by the physician. There are tasks performed as a matter of hospital policy, and tasks related to psychosocial enhancement of the patient; these should also be included in the overall development of a model. Tasks in the latter group include such processes as alleviating patient anxiety and conducting preop psychological preparations. These components do not really come into the realm of specific tasks but are important in allocating staff and resources. It is well perhaps to have some type of allocation of time in the model for crisis intervention, unforeseen events that occur on the floor, new admissions, and or emergencies.

We should move with caution. When some of the variables for success have been met, a system that will summarize the existing knowledge will provide an explanation for observed events. It will also predict the occurrence of future relationships that will be most helpful to the nursing profession. This will essentially integrate the physical system, human organization, and the information system into an efficient and consistent overall system. I do not feel that provision of an automated system is the answer to every problem in a hospital, but it may serve as a useful tool in administrative and clinical care.

From 1967 to 1969 I was involved in a cost analysis and quality of care study, and at that time I was not aware of any successful attempts, through the uses of different changes in staffing patterns, to reduce the cost of patient care. Maybe in the total overall operational costs of the hospital this could be accomplished, but I have yet to see a hospital that reports to its patients, "We are going to charge you $50 less a day because you are receiving less nursing care than other patients or because you are on a restricted diet."

At that time I proposed that we try to look for a more equitable system for charging patients based on the amount of nursing care the patient received. A more equitable system could be arrived at with the use of an equation that includes the following components:

(a) fixed amount for hotel costs;
(b) cost of individual nursing care calculated on tasks to be done for the patient, type of personnel required to carry out the task, salary per hour, and equipment used;
(c) other items shared by all patient charges such as services of ward clerks.

There is much to be done in this area. Whether or not automated data processing systems are the vehicle for accomplishing better patient care remains to be investigated using criteria established for overall success.

Concept Modeling in Hospital Staffing

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In a recent symposium, Morris described the process of model development in the following words: "The process of model development may be usefully viewed as a process of *enrichment* or *elaboration*. One begins with very simple models, quite distinct from reality, and attempts to move in evolutionary fashion toward more elaborate models which more nearly reflect the complexity of the . . . situation.

"This seems harmless enough, yet it is of some importance to point it out explicitly. . . . The attempt to begin immediately with a rather rich model may become a serious source of frustration. Starting simply gets things moving and thus tends to relieve some of the tension. It does, however, require a certain amount of poise or 'guts' to back off from a complicated problem and begin with a simple conceptual structure. It requires one to deliberately omit and distort certain aspects of the situation and to knowingly commit the sins of suppressing difficult considerations and suboptimizing (*1*)."

Models are abstract representations of a set of empirical phenomena. The successful model not only "must be isomorphic with its domain of application (*2*)" but also much correspond to a formal system or validated theory for that set of phenomena (*3*). Willer says of models, "A model contains a rationale and nominally defined concepts which are structured in the form of a mechanism. A model is cumbersome and complex in comparison to the purity and parsimony of a formal system. . . . There is a one-to-one correspondence between the relationships developed in the mechanism of the model and those of the formal system. . . .

"The terms and relations of the formal system were derived from the concepts and mechanism of the model, respectively, and neither the concepts nor the mechanism are part of that formal system. The purpose of the model is to generate relationships . . . . The formal system is limited to statements of relationships in the simplest possible form in order to make them easily testable (*4*)."

Three kinds of models are generally described in the literature: analogue, iconic or typological, and symbolic. Churchman says "an analogue model employs one set of properties to represent some other set of properties which the system being studied possesses (*3*)." Willer says "analogue models are constructed by allowing some set of properties, structure and (or) process A to *stand for* the properties, structure, and (or) process of the phenomena being studied, X. This is most commonly done when the A properties are better known and more familiar than X (*4*)." The major advantage of the analogue model is the known reference or starting point. However, the inherent weakness of "borrowing" rather than constructing the rationale and the mechanism may render the model ineffective, particularly if the analogues are not isomorphic with the phenomena being explored.

Iconic or typological models are generally scalar models of direct similarity to the subject they represent. The mechanism of the iconic model depends upon the number of similarities between the model and reality. As the model increases in abstraction the similarities decrease, and the model is rendered useless. Iconic models are strongest at lower levels of abstraction. If properly constructed the iconic model is isomorphic with the phenomenon. If the transformation from reality to model is only scalar then isomorphism is assured.

When a set of empirical phenomena is represented directly by a series of nominally defined concepts, the rationale for such representation is iconic. However, unless the concepts that represent the phenomena are structured in a mechanism of some kind, the end result can be nothing more than a conceptual scheme with little, if any, capacity for prediction. The effectiveness or success of iconic models depends upon abstracting a mechanism from the phenomena and then using the mechanism to order or connect the concepts.

The symbolic model is more formal in its construction than either the analogue or iconic model. Additionally, the symbolic model has a strong but not rigid mechanism. As Willer says, "Symbolic models are constructed by the meaningful interconnection of concepts. Models of this sort are symbolic in that (1) their general rationale consists of allowing a set of connected concepts to symbolize a set of phenomena, and (2) their symbols or concepts are the source of their mechanism (*4*)."

The construction of a symbolic model begins with the nominal definition of concepts and the development of rationally consistent assumptions. It is not unusual for concepts to be theoretically as well as nominally defined. The structural and functional relationships of the concepts may be derived from their theoretical definition. Explicit assumptions, in addition to the implicit assumptions of theoretical definitions, may be introduced.

The meaning of the concepts and the relations between them provide the rationale for the symbolic model. If the construction of the model begins with the definition of concepts and the development of assumptions, the rationale will evolve. On the other hand, it is not unusual to begin with an explicit statement of the rationale that then becomes the basic assumption for the model. As each concept is operationally defined and its meaning made clear, it leads to further definition and clarification of related concepts.

Although there are no formal rules for model development, it is wise to keep in mind Morris' admonition to start simply and "make haste slowly" toward the more elaborate model that reflects the complexity of the situation. The primary requisite in all instances is extensive knowledge of the phenomena for which the model is being constructed.

There are, of course, certain phenomena sufficiently circumscribed that expert knowledge from a single discipline is adequate. However, the phenomena with which we are dealing is of such complexity that, to date at least, attempts to construct models have been most successful when the knowledge from several different disciplines has been brought to bear on the problem. The remainder of this paper discusses one particular model.

Development of a Patient Care Model

Introduction

The project discussed here is part of a long range research program of the Systems Research Group at Ohio State University. The primary objective has been the development of methods for investigating complex man-machine systems. That part of the program dealing with health systems has been directed toward the development of a measure of patient care and a model of health care systems relating the measure to health system behavior.

When one speaks of a measure of patient care, the listener generally tends to think of a scale, a checklist, or some other such instrument. The measure of patient care developed during this project is not a "tool kit." It is a descriptive model at the tactical, or bedside, level. It is descriptive of the interactions of the individual patient with various members of the health team and reflects patient response to system behavior.

The early phases of the work were characterized by multidisciplinary organization. Representatives of the various disciplines investigated those aspects of the problem that were traditional with them. For example, the sociologists looked at such things as status relationships and work performance, the psychologists examined personality variables and patient progress, and the operations researchers studied problems of inventory and resource allocation. Fruitful as these activities were, they still did not attack the major problem: how well is the hospital doing its job? The degree to which the research concepts and variables were common to the various disciplines was limited.

Conceptual Framework for the Model

The later phases of this study have been interdisciplinary. Unifying concepts were selected, and the research has been conducted in a conceptual framework common to representatives of all the disciplines involved. Cybernetic concepts provided the framework for the development of the patient-care model (*5,6,7,8*). These concepts have been criticized as being mechanistic; i.e., ruling out the richness of variable human behavior. They are, in fact, based on the behavior of living organisms (*7*). Beginning with Bernard's disturbances and responses of the internal and external milieu (*9*) and with Cannon's ideas of homeostasis (*10*), the concepts have been revised and extended by advances in information theory, communications, and computer technology (*11*).

The basic concepts of cybernetics are information and communication, regulation and control. Von Bertalanffy describes cybernetics as "theory of control systems based on communication (transfer of information) between system and environment and within the system and control (feedback) of the systems function in regard to environment (*12*)." Weiner, who coined the term, defines cybernetics as control and communication in the animal and machine (*6*). Ashby calls cybernetics a theory of machines that treats not things but ways of behaving. It does not ask, What is this thing? but, What does it do? It is thus essentially functional and behavioristic (*11*). Cybernetic concepts are familiar to a number of disciplines such as medicine, physiology, psychology, and sociology.

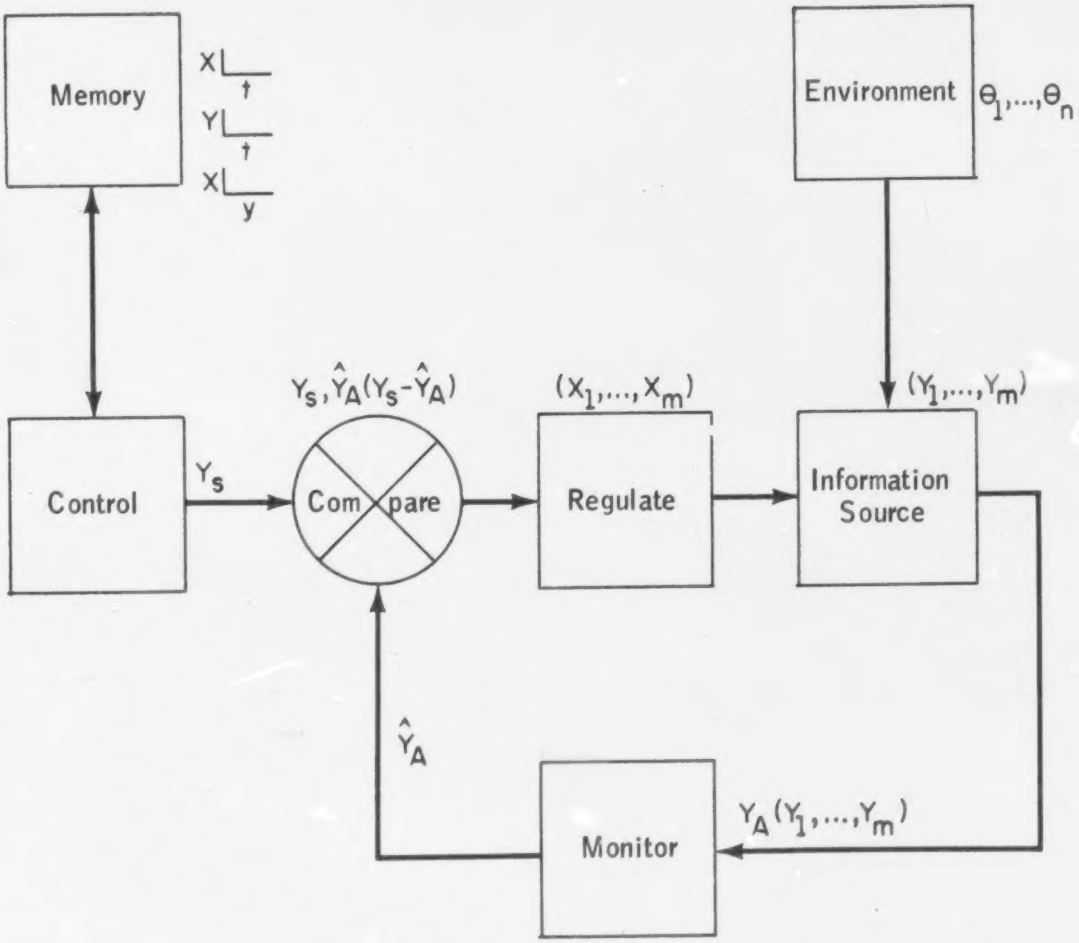
The cybernetic model is primarily concerned with communication and information flow in complex systems. The model feedback, control, and regulation has applicability for biological and social systems as well as the engineering problems to which it was first applied. Every system is subject to forces that make it necessary to adopt to change in the environment, internal or external. The homeostasis, dynamic equilibrium, or steady state model is essentially a process of balancing the components of a system in response to change in the environment. The system can adapt through feedback information to a wide variety of situations (*13*).

The patient care model we have developed is a descriptive model at the tactical level. It is descriptive of the interactions of the individual patient with all members of the health team. The patient is viewed as an information source communicating with members of the health team through a variety of sensory input channels. Information about the state of the patient is obtained by the nurse or physician or other health team member who observes patient behavior.

Comparisons are made between the actual state of the patient and the desired state. Action is taken to reduce any difference that may exist between them. The rationale for the model is that the patient care system is adaptive, relying on information feedback to cope with disturbances from the internal or external environment (*14*), and that the purpose of the system is the reestablishment and maintenance of homeostasis (or dynamic equilibrium) for the patient (*15,16,17*).

The patient care model was developed by first conceptualizing an integrating model based on cybernetic concepts (*17*) to serve as a theoretical point of reference for the collection of data about the phenomena that the model represents, patient-health team interaction. These data were used to refine and extend the model to its present form (figure 1). The system or subsystem can be described as a series of *functional* components with the following behaviors.

Figure 1.—Patient care model.



The control function consists of specifying the limits within which the patient is to be maintained (symbolized as Y_S). The limits are based on knowledge about the individual patient as well as medical and nursing knowledge in general. Limits are subject to change as the patient progresses through the course of his hospitalization or as new information is obtained.

The function of the memory unit is to store knowledge and information. The content of the memory unit is constantly updated. The patient represents the signal source transmitting information about patient state (symbolized as Y_A) to the monitor where the information is observed and recorded or displayed. The function of the comparator is to compare the actual state of the patient as observed by the monitor to the desired state specified by the controller, and to note any differences between them (symbolized as $Y_S - Y_A$). The regulatory function consists of selecting and carrying out the appropriate action [symbollized as (X_1, X_n)] necessary to reduce the difference between the actual and desired patient states. The patient, as a process, responds to inputs from both the environment and the regulator.

Collection of Data for the Model

To develop a model that accurately describes the behavior of the system in terms of the patient's response to the allocation of hospital resources, it was necessary to observe the interaction of the patient and various members of the health team in a variety of settings throughout the hospital. Since the system is adaptive, it is not possible to predict a priori when interactions or changes will occur.

To obtain the comprehensive data needed to develop the model, patients were observed continuously (24 hours a day) from admission through discharge. We explored several methods for collecting the data. During the earlier work on this phase of the project, we collected data in the operation room by visual observation and manual recording of events supplemented with tape recording. The time span for those observations was relatively short, the number of variables was relatively few, and the situation was controlled by the anesthesiologist and the surgeon.

We considered electronic recording equipment but found it to be impractical when the patient was ambulatory. We also considered video recording. This method is excellent for collecting continuous data in well controlled settings such as the operating and recovery rooms or the intensive care unit where cameras can be ceiling mounted and remotely controlled and where the time span for observations is relatively short—4 to 8 hours. But the high cost for equipment and technical assistance and the low reliability of the equipment when used continuously over long periods, as well as the limited range of the camera's scope when the patient is ambulatory, made it impractical for our purposes.

We finally decided that nonparticipant observation with manual recording of data in the form of a narrative description of events would give us what we needed. We decided to use nurses to collect the data, for several reasons. First, observation is considered an essential part of the nursing process. Second, the hospital would be a familiar environment and nurses would be less concerned with their surroundings than would observers from another discipline. Finally, nurses would be able to identify various personnel interacting with the patient and the procedures being carried out.

We developed a manual of data collection designed to orient the observers to the project and indicate what was to be observed and how the observations were to be recorded (*18*). The entire philosophy of the data collection was that of the "now generation," *tell it like it is*. We used a variety of techniques to prepare the observers, including the use of videotape and practice sessions in various hospital settings. We also used videotape and dual observations to determine interobserver reliability.

The observers were formed into six member teams, with each member of the team responsible for the same 4-hour block of time each day during the patient's hospital stay. Observations were begun when the patient was admitted to the hospital and continued until discharge. Wherever the patient went the observer also went and recorded, as objectively as possible, a narrative description of "who did what to, for, or with the patient and how the patient responded." Ten patients were observed. The length of stay ranged from 9 to 24 days. With observations on a 24-hour basis, approximately 3,000 hours of time series data describing system behavior were collected. Five complete sets of data are being used.

The data, recorded as narrative description, had to be reduced to a format suitable for computer analysis. Again using the conceptual framework to provide the guidelines, we developed a coding format that allowed numbers on punchcards to be translated into sentences. The sentences can be read as "at this time, in this location, this person is doing this to, for or with the patient, and this is the patient's response" or "at this time, in this location, this is the patient's state and this is being done, by this person."

Analysis of the Data

The analyses of the data are described in the final report for this project. The description of the programs for analysis comes directly from that report (*19*).

With the capability of computers, the systems researcher is able to deal with the complexity of multivariate systems. However, it is necessary to specify the final output and prepare the necessary programs to generate the specified output. So far we have developed four basic programs for data analysis.

If the model is descriptive of system behavior, one of the first questions to be answered is, who does what for patients, when, with what resources, and how does the patient respond? A program was developed to cross-tabulate the following:

(a) resource and patient variables with time,
(b) patient with resource variables,
(c) resource with resource variables,
(d) patient with patient variables.

The yield from this program has been a series of frequency histograms that demonstrate patient-resource interactions such as the frequency with which various levels of personnel carry out various activities during each day of hospital stay. Scrutiny of these functions is expected to suggest hypotheses that can be tested, either in the real world or with data generated by the model.

Because tabular data are difficult to interpret, a graphic time series plot was developed. The plot is designed to demonstrate the concomitant variation of patient and resource variables. The original plot of 24 variables has been expanded to allow up to 120 variables to be plotted simultaneously. The plots can be examined to determine the state of the system when situations that require nursing intervention arise (*20*).

The third basic problem is a search program. Having specified, or located, a critical patient vector, such as pain, the data are searched prior to our following the occurrence of such a vector to determine patterns of resource allocation that follow or precede it. Analysis of the data in this fashion makes it possible to determine to what extent resources are allocated on the basis of patient information and to what extent other considerations are more important (*21*).

The three previous programs deal with the individual patient. They describe the interaction of the patient with the system environment in time. To generalize from the individual patient, it is necessary to sum the results across patients. This is a function of what Ashby calls the R x D table (*11*) that describes the consequences of a system response to a disturbance in the environment (see figure 1).

The R's represent resource allocation in response to the D's, disturbances such as pain. For example, if pain is a disturbance (D) and the administration of Demerol a regulatory action (R), the resulting state of the patient would be found in the cell at the R-row, D-column intersection. As more data are obtained, the cells can be filled in. If there are statistical regulatives the probabilities of various patient responses to regulatory-disturbance can be determined.

The patient care model has not been developed to that stage earlier identified as the ultimate goal of the model builder—the mathematical model. It has, however, been developed to a stage that allows us to examine the patient's response to system behávior, to determine who is doing what for patients, when, with what resources and with what responses.

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DISCUSSION OF DR. PIERCE'S PAPER

Discussion Leader

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Throughout this conference, concerns have been expressed regarding the lack of model development, the need for a theoretical framework to direct inquiry, the disappointing progress in the development of measures of care, and the failure to make the utility of nursing explicit. Implicit in all these are further concerns regarding decision making, patient outcomes, and allocation of resources.

Dr. Pierce's paper represents an approach to all these concerns. The key elements in the adaptive system model are communication and control. As it is presently composed, it is descriptive, not predictive. We do need to know the outcomes and consequences of various regulatory strategies in the management of patient condition, and we do need to be able to predict these outcomes. Otherwise the approach (the model) is not going to be utilized by practitioners, by administrators, or others in the health care system. It should be useful to researchers, also.

There has been further criticism that the model has been used only in hospital settings. But the attempt originally—and I think it still pertains—has been to move out of the hospital setting into the community and the home, wherever there is a consumer of care. In a series of three papers on nursing research and the development of the system model produced in 1964, there was concern for the various settings in which the consumer of care finds himself and the classes of variables that must be attended to and studied.

The model is especially helpful in selecting critical variables for nurse action or for nurse intervention. I think we have to consider what the nurse attends to, what the physician attends to, and certainly what the patient attends to, because he, himself, is a regulator of his condition. We have to complete this cycle and consider consequences for the patient. I chose the recovery room as a source of data for my doctoral dissertation. In that setting, there is a circumscribed period of time in which the patient is captive, so to speak, and the classes of variables that one attends to are fairly limited. But if you think of the physiological and psychological variables of concern there, then as the patient returns to the unit following recovery (from anesthesia) other variables come into focus. We are concerned with social variables and economic variables, for example.

These variables change over time, too, as do the goals of the subsystem. One thing that should be added to figure 1 of Dr. Pierce's paper is that time is a critical variable that thus illustrates the dynamic component of the model. Another very crucial element is that the focus is on the patient. Of primary concern, too, is the interdisciplinary effort required to tackle this question, this problem. There has been ctiticism of the model and a lot of argument about it, and someone made the comment earlier, Why is it that each one has to develop his own model? Why can't we use a model, redesign it, refine it, and be critical in a constructive kind of way? Unless we test available models in the real world we will delay inquiry and interaction and any kind of professional, scholarly attempt to get a handle on the concerns we have been discussing.

Summary, Synthesis, and Future Direction

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Our conference started with a discussion of staffing studies based on an engineering model of nursing performance. In the studies reported, nursing activities were measured along production industry modes: standards, standard times, work sampling, etc. These are very useful to the degree that nursing is a sequence of tasks to be performed within given limits of time.

Criticism of limitations of the engineering model was evident in the discussions following the formal presentations. Some suggested the engineering model is faulty in that the tasks approach does not reflect nursing responsibility for emotional support, for patient instruction, for coping with nonmedical and nonhospital patient concerns, and for family management.

Illustrations of nursing performance in the "psychosocial" facets of patient care and support were frequently cited in papers and discussion at this conference. Nurses in hospitals have not yet explicitly defined these facets of care, and I think we nurses are fully cognizant that such definition must be ours. It cannot be delegated. Definition, description, and then measurement cannot be hoped for except through our own efforts.

One criticism of the engineering modality is that it can measure only what is being done overtly. It cannot measure what nurses have not defined. It cannot set ideals or standards of excellence. Measurement means some type of definition and quantification of what can be physically discerned.

Another criticism of the engineering model derives from the construction of discrete, specific time per activity from work and time studies; i.e., a mean, a point estimator without indication of levels of confidence. Without confidence intervals being made explicit, nurse staffing based solely on an engineering model will be suspect not only by nurses but by administrators and economists precisely because the flexibility of confidence intervals is not built into staffing estimates. If the notion of confidence interval in nurse staffing estimates does not apply, can engineers and statisticians make us understand why it does not?

Patient classification schemes were presented and criticized during the conference, but there is perhaps more similarity in patient schemes than we are prepared to admit. Questions of their validity and reliability have been raised frequently, yet several speakers reported coming to comparable conclusions. I refer you to the Canadian series that was reported for us by Phyllis Giovannetti. It seems evident that patient classification scheme as a base measure of nursing workload is generally applicable despite the concerns expressed—inability or unwillingness or impropriety of generalizing among hospitals that often seem comparable from the outside.

Hospitals seem comparable from the usually reported data: size, whether or not they are voluntary, etc. But they vary widely internally. They vary as to style and capability of their general administration. They vary about medical therapeutic capabilities and ambitions, the adoption of fashions, whether they are cobalt bombs, organ implants, or transplants. They vary as to internal organization. They vary as to allocation of responsibility and of costs to nursing. Each of these variances has a major effect upon nursing care and nursing administration. Dr. Gerrit Wolf's report of his peer review study pointed this out.

The fact that the engineering model alone is presently incomplete does not suggest to me it should be replaced with another model. Rather, progress reported in the literature suggests its continuing usefulness if engineers, nurses, hospital administrators, and trustees are sophisticated about what it can and what it cannot do and are prepared to apply it with full understanding of the proper concerns and reservations of each of the parties.

Human services have all of the problems, human problems, that production industry has. But these are compounded by a product that in itself is human and therefore must be described and measured in human terms. Industrial design is much easier to deal with than nursing care design. Nursing supply and performance and production are characterized both by human inputs and human outcomes. Describing and measuring them in human terms (and engineering modes can be humanized) is the only real way, however difficult this may be.

John Griffith introduced the bargaining model. He did not suggest substituting the bargaining model for the engineering model; they can complement one another. A bargaining model would make explicit the administrative relationships between trustees and administrators concerned properly with costs, and the professionals, nursing included, concerned with quality of professional performance. The bargaining model makes constructive advocates out of each, placing them in opposition to negotiate apportionment of hospital resources to achieve both hospital efficiency and professional effectiveness; i.e., quality patient care at a tenable cost.

Gerrit Wolf's peer review report reinforces the need to attend to administrative relationships and the bargaining skill of all parties to it. Negotiation goes on constantly between nursing administration and other departments, and perhaps the process and content of such negotiations would shed light on nursing load and its changes, nursing utilization, and so on.

The bargaining concept leads inescapably to advocacy. Improving patient care through this mode requires that both administrators and professionals accept negotiation as good, healthy, and useful. Attitudes will need to be changed and sophistication in the modes and processes of bargaining must be developed. Successful bargaining rests upon negotiation from strength, mature understanding of power, and the development and constructive use of it.

One wonders what would be revealed in the study of the amount of nursing power, its sources, present and potential, and its uses, present and potential. Can patient care in hospitals really be either efficacious or efficient with nursing unable or unwilling to become skilled advocates for it? Application of the bargaining model raises many useful questions, power being only one of the more obvious.

Dr. Flagle and Mrs. Giovannetti asked in different ways whether it is not now time to approach nursing staffing and its host of related issues through systems analysis. Mrs. Giovannetti's paper contains a scheme for looking at the entire health care system, nursing included. Dr. Flagle suggests fundamental questions about the objectives of the health care system. Specification of objectives of the health care system and the measurement of their achievement are difficult. Perhaps that approach for some researchers could help rationalize the nursing subsystem in hospitals.

The Pierce report adds both weight and portent to that approach. Often in the discussion, factors in the climate in which nursing is practiced were mentioned, and their effect upon nursing staffing, nursing utilization, and nursing effectiveness were alluded to, but their identification and systematic in depth investigation lie ahead.

Dr. Aydellotte spoke of the effect of the variety of medical styles upon nursing staffing. Experienced observers of the hospital scene know one cannot completely study nursing or get definitive answers except within the framework of the given hospital's medical style, medical capability, medical ambition if you will, medical modes of practice. The ranges of therapeutic capability present or grasped for has a critical effect upon nursing staffing. Medical milieu simply must be studied to afford a complete understanding of the problem. The same is true for the hospital's style of general administration. Research into these relationships is urgently needed.

The most frequent question raised in discussion periods at this conference has been that of quality of nursing care and its measurement. Though beginning attempts at definition and measurement are under way, the major work lies ahead and its priority after this conference would certainly seem to be very high. Perhaps ways can be found to document and synthesize what work has been done and subsequently to convene persons knowledgeable in investigation of the question and in application of modes of documenting quality in nursing care given.

My assignment for this summary included the charge to make explicit some of the "straws in the wind" of the future. Clearly, greater attention to the economics of health care is made mandatory by the growing resistance to continuing rise in costs. John Griffith referred to the inclusion of health care costs under the Federal Price Commission; references to the cost benefit ratio are increasingly common in literature and professional conversation.

The emphasis of this conference on the urgency of identification and measurement of quality in health care delivered is underscored by developments like the Commission on the Quality of Health Care as proposed in the Kennedy bill, and the refinement of standards and criteria of the Joint Commission on Accreditation of Hospitals. Professionals who are making health care the field of their career endeavors—physicians, nurses, administrators, engineers, social scientists—must come to grips with an operational, measurable definition of quality of health care, specifically nursing care.

Our habit is to describe the ideal. Although the ideal is certainly important, experience suggests one can work toward it only by delineating and pursuing first what is feasible and rational. One of our speakers introduced the notion of "moderate utility," the concept I am advancing here. Is it possible to identify critical indices of quality rather than concluding that we have no quality at all unless we measure everything imaginable?

Another point of future direction lies in the refinement of patient classification schemes. Questions of validity and reliability remain, but the general applicability of patient classification schemes suggest their usefulness. As Mrs. Giovannetti pointed out, the question is not whether they are good or bad; the question is how do we refine them so as to make them more widely useful. What other measures of patient load are there?

Surely the future will bring greater study of organizational and operational management of nursing services. Systems analysis and design hold great promise, in my view. So too does the concept of management by objectives. Horizontal and vertical relationships and controls exercised by nursing and upon nursing need to be studied. Long overdue are studies of the effect of hospital administration and of the effect of medical practice upon the organization, objectives, and character of nursing load and nursing care outcomes.

We gave patient satisfaction no attention in this conference. It may be that the fashion of studying patient satisfaction has passed. It may be that we know all we need to know about it. I am not familiar with what we know about it, but I was struck by the absence of discussion of patient satisfaction. Indeed, I drew an inference from discussion that patients might be thought incapable of judging the quality of care. I do warn against this inference, because we are moving more and more to the notion of satisfied customers in a population becoming more sophisticated and more vocal about health care.

Study is needed of the purposes and processes of surveillance of nursing performance: of supervision, the supervisory process in nursing; of controls upon or within nursing; of the skill and sophistication of nursing administration and the consequences of their presence or absence.

Almost 20 years ago I studied nursing administration in hospitals in Michigan. I was startled to learn then that the nursing department budget exceeded the budget of almost 40 percent of the industries of the State of Michigan listed in the Manufacturers' Directory. Few recognize the magnitude of the operation nursing administrators are responsible for or the educational and personal qualifications crucial to adequate management of present day nursing services. Directors of nursing are often appointed because of tenure in other posts in the hospital or acceptability to the medical staff. The future will be stormy indeed wherever such practice continues.

I recognize that our conference was directed toward staffing in hospitals, and hospitals will continue to hold a crucial place in the health care delivery system. But the future, in my view, will see greater development outside of hospitals than in them. Will the modes for rationalizing, measuring, and justifying nursing care and service requirements we are developing now be applicable outside of hospitals? What has been or will be learned in hospitals that, if appropriately applied, will prevent public health nurses from "reinventing the wheel?"

If the already discernible movement away from individual fee for service medical practice toward Health Maintenance Organizations and other group or corporate modes or practice actually proceeds, then I fail to see how medical services can escape analysis and insistence upon quality assessment and staffing justification, as nursing presently is experiencing. What a public gain it would be if the modes developed in response to appropriate pressures on the nursing profession were found to have transferability to medicine!

Appendix

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Task Force Reports

TASK FORCE TOPIC: Future Directions for Research on Nurse Staffing in Hospitals

In this context, the Task Forces are asked to—

A. Identify areas of needed research:
   1. identify factors that may facilitate research in these areas,
   2. identify specific obstacles hindering research in these areas.

B. Determine needed resources:
   1. skills, and how they may be developed,
   2. funding, and appropriate sources,
   3. other.

C. Determine priorities for research.

D. Explore means of coordinating work of researchers and utilizers: ways to improve communications.

E. Recommend nature of further conference on nurse staffing research.

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REPORT OF TASK FORCE NO. 1

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Recommendations

A. Future Research Studies

1. A study to establish a theoretical base of knowledge of the "caring relationship." What do we mean by "care" and "caring?" Based on the above applied research to then determine,
   a. Where should care be given or provided?
   b. Who should provide various levels of care? (responsibility and accountability)
   c. Careful delineation between the various caring roles in the delivery of health care systems.
2. Various disciplines need to join forces in designing studies including economists, industrial psychologists, sociologists, statisticians, industrial engineers, and well qualified nurse researchers.
3. Studies to look at various staffing mix patterns. The *nurse clinician*(s') role and utilization should definitely be in these mix patterns. Their contributions to the quality of patient care need to be identified and the cost analyzed within inpatient and ambulatory settings.
4. Studies of nursing practice in other countries, more cross cultural studies. What can we learn from other health care systems?
5. What are the factors that make for delegation or assignment of tasks in multipatient settings; i.e., the question of *specialization* and division of labor vs. *versatility?*

(Personal suggestion from Miss Taylor—skilled nurse researchers should form an independent consultant firm, like private practice, and organize a team of interdisciplinary consultants to really go in and work with a group in a hospital or university to identify the problem, prepare the proposal, the methodology, etc. Perhaps the nurse would need some financial support to help her get started for a year or so until services become known to nurses who would like to get into research but have not had doctoral preparation.)

b. Obstacles to research:
   (1) fragmented roles of auxiliary staff being locked in by union contracts,
   (2) ethnic demand for career opportunities in the health service field,
   (3) *rigidity* of present professional and administrative people to studies of their functions and roles,
   (4) vested interest groups who are threatened by possible findings of studies—fear of loss of jobs, incompetency to do job, job descriptions not clear so uncertainty as to role and functions,
   (5) inadequate preparation of those who will be involved in the study in any way results in false data and thwarting by personnel.

B. Skills Needed and How These May Be Developed

1. Doctoral preparation of adequate numbers of nurse researchers. Most now are in administration and teaching with no time to become really involved in research or even to assist nurses in other than graduate programs (master level), which really is not enough preparation.

2. Nurses who are interested in research should work with an ongoing research study perhaps as apprentices. This would have to include writing a proposal, etc.
3. Interpersonal skills, interviewing and data collecting experience, preparing data for analysis and writing reports.
4. Funding to do needed research was not discussed by the group.

C. & *D.* These topics were not discussed by the group.

E. *A Working Conference to Develop a Master Plan on Strategy for Research in Nursing*

1. Participants should do "homework" before getting together.
2. The conference should follow soon after this (present) conference.
3. Papers should be prepared and sent to participants early, and authors should attend but only to discuss salient points raised by participants that would be pertinent to the development of the master plan.

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REPORT OF TASK FORCE NO. 2

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Recommendations

A. & *B.* These topics were not discussed by the group.

C. Determine Priorities for Research

1. Research should concentrate on clinical practice with emphasis on the need to develop quality control.
    - a. Develop a study of patient oriented structure cutting across professional stratifications,
    - b. Examine the care process related to patient requirements as opposed to traditional examination of the care process as related to professional categorization.
2. This process can be implemented by establishing research teams throughout the country. The research teams should be multidisciplinary and should include, as a minimum, industrial engineers, psychologists and nurses.

D. Explore Means of Coordinating Work of Researchers and Utilizers

1. Any approach to researchers and utilizers should be multidisciplinary.
2. The providers of care must be involved.
3. Organizations such as hospitals, associations, insurance carriers, should be included.
4. Consultants and resource people must be trained.
5. An educational process should be established that would prepare potential implementers to use results of research.

REPORT OF TASK FORCE NO. 3

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Leader

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Reporter

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Recommendations

A. *Identify Areas of Needed Research*

1. General considerations (guidelines)
   - a. Nurses must assume the initiative for research with the assistance of other disciplines.
   - b. Decisions to initiate and implement research are made by the power structure.
   - c. Costs must be considered.
   - d. There is a gap between nursing staff (providers of nursing service) and upper echelons. How do nurses break into the coalition of power?
   - e. All relevant staff must be involved in research endeavors. Involvement is needed to obtain the necessary cooperation and to satisfy various needs.
   - f. What do we want to accomplish by research activity?
   - g. Nursing is presently functioning in an acceptable manner.
   - h. How do we learn new things?
   - i. In studies to improve nursing care, can we offer improvements?
   - j. Are studies getting to the right people?
   - k. Do we have to be purists?
   - l. Really good work (research) is not published. Applied research is not published. How is this rectified?
   - m. All inputs (disciplines) must be considered, as all affect output.
   - n. Who will do research? Where do we get nurses to do research? Individuals on the unit must be involved.
   - o. What are the capabilities of hospital staff to do research. Larger hospitals have greater capability (groupings of smaller hospitals).
   - p. Team approach maximizes implementation possibilities.
2. Areas of needed research
   - a. Recruitment and retention of nurses require satisfaction on the job.
   - b. Why do staffing levels vary, both within a hospital and between hospitals?
   - c. How can nursing be improved?
   - d. Identify criterion measures of outcomes of *health* care. Then identify input of nurses to achieve desired outcomes at various points of time.
   - e. Measure and test nursing inputs. What is it that is going to make a difference to the patient?
   - f. Study staff substitutability. (How can staff be substituted?)
   - g. What are the boundaries (responsibilities) of providers (staff) of care? What is the interaction between staff providing care?
   - h. Study organizational structure in which care is given. How do people act within the system?
   - i. Study system/organizational constraints that preclude giving patient the treatment required.
   - j. Study and clarify the expanded role of the nurse; make a clearer definition of nurse input.
3. Factors that may facilitate research
   - a. Team approach: interdisciplinary with strong nurse input.

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    b. Utilization of individuals in setting to be studied. Individuals involved in collecting data should be aware of aims, purposes, and objectives of the research.
    c. Increase in number of formally and well trained nurses who can do research.
    d. The creation of an awareness of the need for research.
    e. The value system of the nurse educator (related to item 4).
4. Obstacles that hinder research
    a. Insufficient funding, limited sources of funding.
    b. The hospital administration (administrator) does not fully appreciate the research nurse. Education is indicated.
    c. Nurse attitudes: the immediate demands of an operational system have first (top) priority, pressures of an operating system.
    d. The self-recording mechanism.
    e. Value system of nurse educator.
    f. Separation of nurse educator, administrator, practitioner.
    g. Less than full commitment of people who are involved in the research activity.

B. *Needed Resources*

1. Skills
    a. Develop skills of nurses to be research coordinators, liaison persons, also charged with interpretation of the research effort.
    b. Develop skills in assessment and process of nurses at practicing level.
    c. Nurses must know organizational structure of hospital: how hospital works; what prevents action; what solicits responses.
    d. Continuing program to develop new researchers.
2. Funding
    a. Sources should be developed in addition to Federal grants. There must be greater efforts at joint funding. Joint funding could be between Federal agencies, Federal and private sources, etc.
    b. Research activity should be included in the hospital budget. Hospitals should include research in their budget as well as look for supplement funding.
    c. The Division of Nursing should make research in staffing one of its program priorities.
    d. Health system should put dollars aside for research.
    e. There should be Federal funding to support new researchers (recent graduates). This could be accomplished by facilitating the number of grants to such individuals.
    f. Some help should be available to aid new researchers (those with limited research experience) to obtain research grants.

C. & *D.* These topics were not discussed by this group.

E. *Recommendations—Future Conferences*

1. More nursing administrators should attend future conferences.
2. Narrow the focus of future conferences (fewer topics).
3. Future conferences should present more studies with nursing input and data, more emphasis on studies done by nurses.
4. Should the current meeting have only involved nurses? There was a feeling that nurses must coordinate and articulate their own ideas before a meeting involving multidisciplines. Nurses must decide their own function (role) before having a meeting such as this conference.
5. Staffing is not the problem. Effective utilization of people should be the focus as it relates to outcomes (identify nursing outcomes).

REPORT OF TASK FORCE NO. 4

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Recommendations

A. & *B.* These topics were not discussed by this group.

C. *Priorities for Research*

1. Directly related to nurse staffing in hospitals
    - a. Further pursuit of Miller-Bryant studies on the mix of personnel with particular emphasis on cost-benefit analysis.
    - b. Can we demonstrate the unique contribution of the RN; e.g., the psychosocial components of nursing as opposed to the task analysis approach?
    - c. Studies which focus on the patient; i.e., what is he generating that we have to attend to? What kinds of decisions need to be made? What kinds of appraisals need to be made?
    - d. How can we improve staff productivity?
    - e. How much is spent, regarding effort and cost and time, on the control of quality of care?
    - f. What are the costs of on-the-job training where turnover is high?
    - g. Development and study of models of how things could be.
    - h. The effect of technology on nurse staffing.
    - i. More multidisciplinary approaches to staffing studies.
2. Indirectly related to nurse staffing
    - a. Studies of director of nursing; i.e., innovative, styles of leadership, etc.
    - b. Analysis of conflict relationships between the director of nursing and administration and trustees on the basis of issues; i.e., what issues produce conflict?
    - c. International comparative studies of nurse staffing in hospitals.

D. *Coordination of Work Researchers and Utilizers*

1. Communication
    - a. Clearing house for studies; e.g., Division of Nursing, ANF.
    - b. Encourage reporting in professional journals.
    - c. Establish a list of people interested in nurse staffing, such as this group, and keep in touch on an annual basis with what they are doing. Circulate this list of current activities.
    - d. Regional meetings of researchers and utilizers on the problem of nurse staffing.

E. *Nature of Further Conferences*

1. Narrow the focus.
2. Provide lead time to prepare oneself for more free discussion and reflection on problems to be discussed. Distribute papers in advance.
3. Maintain the multidisciplinary approach.
4. Maintain the Task Force format.
5. Small interest groups might be organized in the evenings on a voluntary attendance basis.

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